Vol. VIII. JUNE 1924. No. 4.

THE MADRAS
Forest College Magazine.

* * *

EDITED AT COIMBATORE.

MADRAS PRESIDENCY.

* *

Published by the Principal,
MADRAS FOREST COLLEGE.

PRINTED BY S. VINCENT AT THE ELECTRIC PRINTING WORKS,
COIMBATORE.

DON'T SWELTER
IN THE HEAT
THIS HOT WEATHER

Here's the Helpful

JOST'S
RADIO FAN

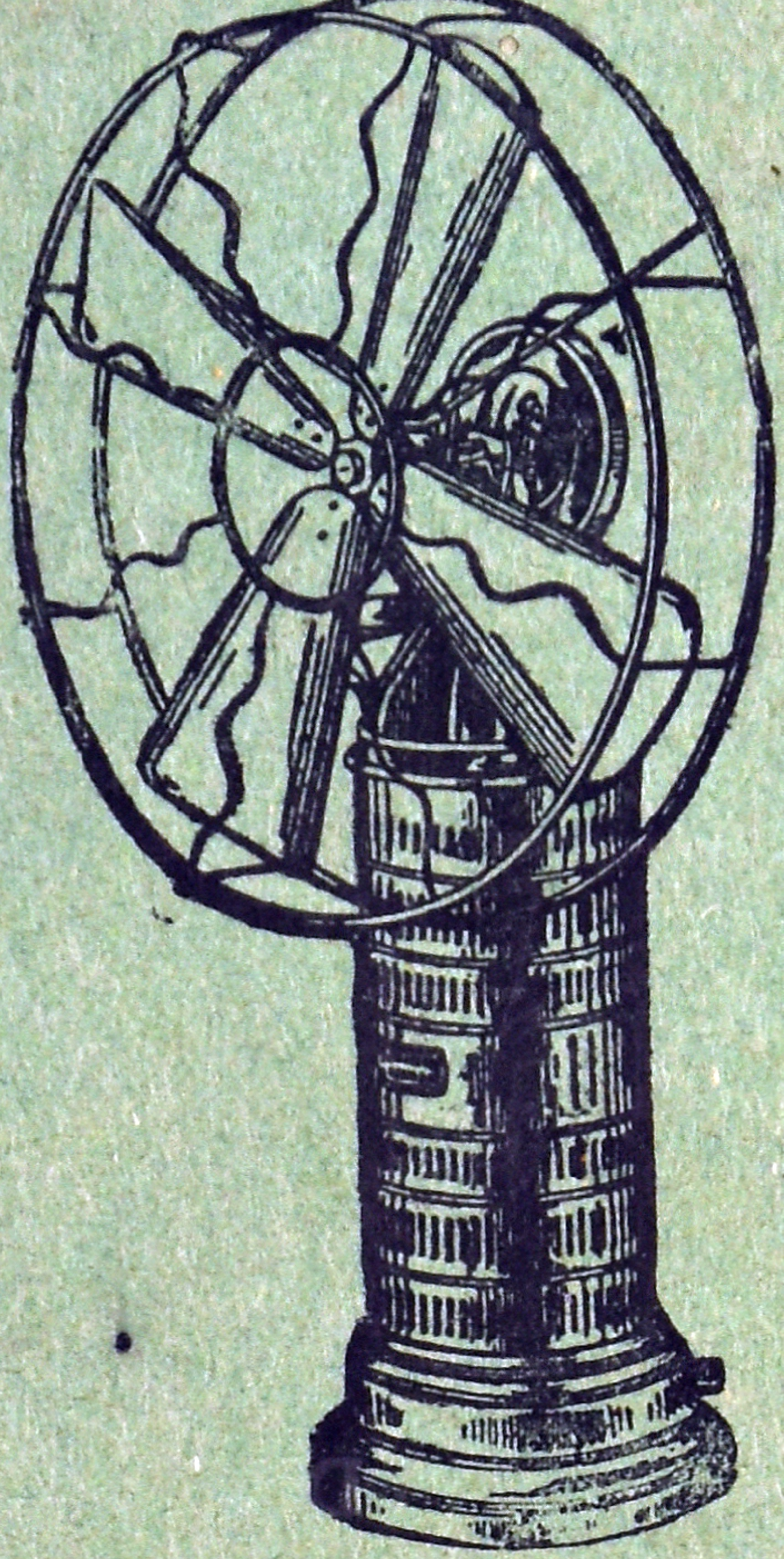
ready to cool the warmest wind and waft a pleasant breeze all around.

Most suitable for Home, Office, Camp, School, Club, Hospital, Mess etc., 4 Models to suit all needs.

SIMPLE, RELIABLE EFFICIENT AND CHEAP

Runs on Kerosene at low cost.

Select one to suit your needs from our Special Jost Fan Pamphlet—FREE.



"REX"—B
Four 21 inch blades, 300 revolutions per minute. Weighs 24 lbs. complete in case.
Rs. 150 nett.
Rs. 8 extra for wooden stool.

P. ORR & SONS LTD.

Post Box 317,
MADRAS.

THE

Madras Forest College Magazine.

Vol VIII. JUNE 1924. No. 4.

CONTENTS.

PAGE.

1. Forest Management—*By, C. E. C. Fischer Esq., I. F. S.* ... 193
2. On the management of Village Forests. (Winning Essay for the Chief Conservator's Prize of Rs. 30/- —*By, M. R. Ry. A. Siddan Pillai, Range Officer.* ... 209
3. The Sandal Tree, Fourth Essay for the Indian Forester Prize for 1923, for M. F. C. Students.— *By, S. Rangaswamy M. F. C.* 1922-24 *Dn.* ... 216
4. Note on Parlakimidi Forests—*By W. O. Newsam I. C. S.* ... 223
5. Regeneration operation at Dhoni—*By, K. P. Rajalingam M. F. C.* 1922–24 *Dn.* ... 230
6. Prismatic compass survey—*By, M. R. Ry, C. M. Kushalappa, E. A. C.* ... 237
7. Exploitation in Dhoni valley—*By, B. H. Ananda Rau. M. F. C,* 1922-24 *Dn.* ... 239
8. Extracts. ... 243
9. Contributions to the Gass Forest Museum. ... 254
10. Additions to the M. F. C. Library. .. 255
11. Gazette notifications. ... i
12. Advertisements.

COMMITTEE OF MANAGEMENT.

—:o:—

President:—**W. G. DYSON, M. C., I. F. S.**

Business Superintendent:—**C. R. F. WILLIAMS, M. C., I. F. S.**

Editor and Treasurer:—**G. VISWANATHAM, B. A.**

Assistant Editor:—**S. RANGASAMI.**

NOTICE.

In continuation of the Notice in the last issue, subscribers are requested to send in, to the address of the Editor, their votes for what they consider to be the best article written by a contributor of the Ranger class, published in this, or any of the preceding three issues of the College Magazine. Subscribers should send in the title of only ONE article, together with the name of author, and date of publication. Voters should send their own name address for purposes of check. Votes must reach the Editor before the 1st August, 1924.

A Post Card would meet the case excellently.

[A list of the articles with the names of the authors is printed overleaf].

Date of Publication.	Subject.	Author.
(Sep. 1923 issue)	Earthworms and Soil fertility	S. Rangasami, (M. F.C. Student 1922—24 Dn.)
(Dec. 1923 issue)	My favourite tree (Bamboo)	Dooma Shetty (M. F. C. Student 1922—24 Dn.)
do	Elephant Kraaling in Ceylon	A. E. Perera (M. F. C. Student 1922—24 Dn.)
do	Study of the Care and Management of Elephants	S. Rangasami (M. F. C. Student 1922—24 Dn.
do	Komuttiyeri and Back	T. R. Bushanam (M. F. C. 1922—24 Dn.
(Mar. 1924 issue)	How to keep fit in the Forest Department	G. N. Subba Rau, B.A., Range Officer, Gundlabrahmeswaram
do	My favourite tree (Jack)	Kuttappan Pillai (M. F. C. 1921—23 Dn.
(June 1924 issue)	The Sandal tree	S. Rangasami (M. F. C. Student 1922—24 Dn.)
do	Regeneration operation at Dhoni	K. P. Rajalingam (M. F. C. 1922—24 Dn.
do	Exploitation in Dhoni Valley	B. H. Ananda Rau (M. F. C. 1922—24 Dn.)

THE

Madras Forest College Magazine.

PUBLISHED QUARTERLY,

Vol. VIII.] JUNE, 1924. [No. 4.

Course of Lectures on
Forestry
Delivered at the Agricultural College, Coimbatore.
(By C. E. C. Fischer Esq, I. F. S.)
—Published by kind permission of the author.

Lecture 5.

FOREST MANAGEMENT.

I do not propose to present to you even a summary of the science of sylviculture, that would demand far more time than is at my disposal. I wish merely to give you a general idea of the nature of the factors that come under consideration in the management of woods.

Systematic management.

When a forest is to be brought under systematic management a document is prepared for the guidance of those who will have charge of it; this document is termed a Working Plan.

The Working Plan.

This plan describes the area to be brought under management, the nature of the existing growth, and its past history and management. A detailed survey is made not only of the boundaries and topographical features but also of the conditions of the existing stock. For this purpose, over a certain proportion of the area, all the plants, or all above a certain girth, are measured, counted and classified according to the several species and into girth or diameter classes. Only in this way can a comprehensive analysis of the contents of the forest be worked out. The rate of growth of the several kinds of trees present is arrived at by a scrutiny of the annual rings on the stumps of felled trees or by the measurement of trees of known age if available. Furnished with these data it is possible not only to calculate the total volume of each kind of tree by rule of three, but also to estimate the time it takes for an average tree to attain a definite girth and height. The factors of the locality: rainfall, temperature, prevalent winds, periodicity of storms, the kind and depth of the soils, in short any information regarding conditions that may affect the welfare and growth of the trees, are recorded.

Further, particulars of the local population, its customs and wants, are stated, together with a list of the kinds and quantities of forest produce most in demand. Notes on the location of the markets and their distance from the forest, with remarks on the nature and condition of the communications, will find place.

Objects of management.

Prescriptions.

The Working Plans Officer is now in a position to lay down the objects of management and the method of attaining it, that is to say, whether it is desirable that the area should be worked for timber, bamboos, fuel, grazing or be preserved as a protection forest. It may be even that either because there is no demand, or on account of its degraded condition, he may have to recommend that the forest should not be worked at all. In the latter case he may perhaps prescribe operations for its improvement. He will also prescribe whether grazing is to be allowed, and if so the number of cattle to be admitted, and any special rules that are to be observed. An important feature will be the measures to be adopted for protection against fire.

Natural and artificial regeneration.

The species of trees that are to be specially favoured in the working must be indicated and whether they are to be regenerated by natural or artificial process, in other words, whether the young plants that are eventually to replace the trees cut out at maturity are to be obtained from seedlings sprung from naturally fallen seed, or by artificial sowings, or whetheer they are to be raised in nurseries and planted out. The decision will depend on local conditions. Broadly speaking, natural regeneration is preferred when it is sufficient and readily obtained, as being cheaper and requiring less attention. On the other hand, it can only be depended on where there are a sufficient number of trees of the required kind, all over the area, to produce seeds.

Natural.

In favour of artificial regeneration the following facts may be advanced: any species suitable to the locality may be grown, whether there are existing trees of the same species in the locality or not; the plants can be more evenly spaced; the regeneration is more certain and usually more rapidly effected and, moreover, does not depend on the occurrence of a good seed year in the locality. Though artifical regeneration is usually more expensive, still it may be more profitable financially on account of greater expedition; if the crop thereby comes to maturity earlier the interest on the capital may more than cover the difference in expenditure.

Artificial.

Where fuel is the sole produce required the method selected will be either the pure coppice system or the coppice with standards system. The pure coppice system is probably the simplest way of working a forest. It depends on the power of trees to throw up coppice shoots from the stump left after the tree has been cut close to the ground. The age at which the regrowth will attain a sufficient size in the particular locality to yield fuel of the required dimensions is ascertained.

Systems of Management.

Pure coppice. A very usual age in Southern India is 20 years.

Division into coupes.

Where the area of forest available is ample, the probable quantity of fuel that is required in one year is calculated and twenty blocks of forest are marked out, not necessarily of equal area, but varying according to the quality and density of the growth, and each of such a size that it will yield the quantity of fuel required for one year If, however, the available area is limited it is divided into 20 equal blocks in such a way that, having regard to the variation in the growth, each will yield an approximately equal outturn.

Each of these blocks will be completely felled in turn in 20 consecutive years. Such a block is called a *coupe*, a technical term indicating an area felled over in one year. At the end of the period of 20 years—technically called the *rotation*—there will be a series of 20 coupes all completely felled over. Meanwhile, of course, the first-felled coupe will have grown up again from the coppice shoots that spring up from the old stumps and is now once more ready for felling as it attains the age of 20 years, in the 21st year of working. In the following year the second felled coupe will become ripe for its second harvest and so forth throughout the series, each coupe being felled again after a lapse of 20 years. Of course, if it is found that 25 or 30 years are required to obtain the desired size of stem, then there will be 25 or 30 coupes.

Coppice with standards.

The coppice with standards system only differs from that just described in that at each felling a certain number of the best stems are reserved and left to grow till the coupe again comes under felling, the rest of the growth being cut as near ground level as possible. These reserves are known in forestry as *Standards*. At the expiration of the felling period of 20 years the standards will be at least 40 years old, since they are at least twice the age of the coppice. If they are still sound and likely to improve further they may be left over again for a 2nd and even a third period of 20 years. When felled eventually they will, of course, yield timber. Meanwhile, too, they will have seeded and may have thus assisted towards the regeneration of the stock.

High forest.

All other systems of working, with one or two minor ones which we need not consider here, are known as high forest systems and their regeneration is effected either by naturally sown seeds, by artificially sown seeds, or by planting. It would not serve any useful purpose to recapitulate them, but I may mention that they fall into two groups according as the several age classes are entirely separate or are mixed together throughout the forest. In the majority of cases the forest will consist of a varying number of blocks, each block containing trees of the same age class. The age class may consist entirely of plants all of the same age, as in a plantation, or may cover a period of years that is to say one block may comprise all the plants of from under one to say 10 years of age, the next, all those of from 10 to 20 years, the third from 20 to 30 and so on to the maximum of the rotation—the age at which the final harvest takes place, and which will be a multiple of the period of years comprised in each block, 10 in the instance adopted.

Selection system.

Forests in which all the ages are mixed approach more closely to natural conditions. This system is suitable under certain circumstances, but it possesses inherent disadvantages, and foresters generally prefer a more regular system where local conditions allow of it.

Grazing in the Forest.

There is a burning question connected with the management of forests in this Presidency which it will be advisable to examine now. I allude of course to that of grazing in the forest. Apart from that aspect of the question which affects the welfare of the cattle itself, I have pointed out to you the evil effects produced by over-grazing. Light grazing may not be very harmful but, on the whole, it is preferable to exclude cattle altogether from areas on which timber and fuel are to be grown, as also from protection forests. That this is no unreasonable proposition I will now try to convince you. The provision of timber and fuel and the protection of the mountains are as much a necessity for the welfare of the population, including the cattle owners themselves, as the maintenance of cattle. Why, therefore, should the owners of cattle be favoured in this matter to the detriment of all others? No one surely will contend that a man must be permitted to remove a large quantity of valuable timber if thereby he is depriving others equally entitled and deserving, or with equal want of title and as undeserving. Why then should the cattle owner be countenanced when he commits a similar act of selfish plundering at the expense of the rest of the community?

Ignorance.

At the root of all this evil lies ignorance, and the axe of enlightenment must be laid to this root. This is very evident to any understanding person who hears or reads some of the nonsense uttered at District Conferences and elsewhere on the subject of forests. The unlettered ryot cannot be expected perhaps, to realise these facts without instruction. He sees the forests close at hand and surmises that they have always been there in their present condition. It is seldom that forest deterioration is so rapid as to attract general attention. The lowly peasant, therefore, cannot grasp of his own accord that with increase of population and of cattle the forest is being overtaxed. It is the literate, the legislators to whom we must turn in the first place. Let enlightenment come from above, from such as you, and let it sink down through the social strata to the humblest ryot. I assure you that you can do no more useful service to your country. Therefore, listen !

Possibility.

There is a very pregnant word used in forestry, the term "possibility". This term conveys precisely what I wished to indicate when I gave you the simile of the capital placed out at interest, that is to say the maximum of produce of whatever kind that can be removed from a forest is its possibility in that produce. If a forest is being grown for timber the possibility is the maximum quantity of timber that is being formed in that forest by natural growth during the unit of time contemplated. It is self evident that if you are exploiting several kinds of produce the possibility of each is no longer the absolute maximum for that produce alone but is now the relative maximum.

Grazing possibility.

Well! there is a possibility in grazing just as much as there is a maximum output for any other product. It follows that if the forest is to yield its absolute maximum of timber or fuel there must be no grazing. If you will but consider this statement dispassionately you will see that it is logical and true. Moreover, in a well-managed timber or fuel forest worked up to its possibility no grazing is possible. Cattle to eat at all there must eat the leaves of the trees and that for the very good reason that there is no grass. We have seen that it is one of the objects of management to maintain the canopy as close as possible and to allow no direct sunlight to reach the soil. If the forest is fully stocked to yield its absolute maximum, no direct sunlight will reach the soil and there will be no grass, for sunlight is essential for the growth of grass. It is only in such places and at such times that it is desired to encourage the growth of seedlings for the regeneration and the continuation of the forest that sunlight will be admitted in some measure, but it is precisely at that place and time that grazing would be fatal. It is idle to point out that there actually is grass in many of our timber forests. That is

Grass due to maltreatment.

because of the maltreatment the forests received before they came under the management of the Forest Department and because if the deterioration of the forest is usually comparatively slow its restoration is infinitely slower. In a well-managed dense timber forest, when the trees have grown sufficiently for their crowns to be out of reach of cattle and before it is sought to regenerate it, it would not do much serious harm to anything but the cattle themselves to admit them, but they would find no sustenance, certainly no grass.

Classification of Forests.

Limitation to grazing possibility.

What I have just said does not mean that cattle are to be entirely excluded from all forest areas, but that there should be a very definite classification and separation of such areas as are required for the growing of timber and fuel and for protection purposes on the one hand, and for grazing grounds on the other. This differentitation should be carefully made in the first instance and once made strictly adhered to. Thereafter, cattle should never be allowed into the timber and fuel areas or in the protection forests except in the most stringently urgent cases of fodder famine. Further, it is mischievous to expect that the areas set apart for cattle grazing can support unlimited herds. No private owner of pasturage would admit this. The contrary is very definitely recognised in the grass lands of Nellore where the "Kancha" system prevails. Why then should there be an outcry when Government desires to apply the same sane precautions? I must leave you to draw your own conclusions. The fact remains that, even in the special grazing areas, the number of cattle to be admitted must be limited to the possibility, else the pastures will inevitably deteriorate.

Grazing panchayats.

The system outlined is that which is now under process of introduction by the Government of Madras, but it is not likely to be very successful unless the people themselves assist, and they will only do so if they are taught to understand its absolute necessity. You, gentlemen, will be in a position to disseminate this knowledge. I trust you will carry out your part when opportunity offers.

Improvement of Pastures.

But something more than mere restriction in numbers is required. Agriculturists do not content themselves with just sowing seeds and awaiting the harvest; they cultivate, they improve. Pasture land too, is capable of improvement and therein lies a solution of the vexed question. Let the pastures be given proper care and they will support a far larger number of cattle than is possible in their generally degraded actual condition.

Fire-protection.

The first step is to put a stop to fires which are as harmful to grass lands as to others, for a thick covering of grass is a very effective protection to the surface soil against attrition. I was very much impressed with this fact when visiting the grassy downs of the Palni mountains. It is the practice there, as it is in the Nilgiris, to set fire to the grass in certain areas during the hot weather in order to get rid of the old dry grass stems and secure an early growth of fresh green grass with the first rains. I regret to say that this burning is countenanced, if not encouraged, by Government. In my eyes this is a fatal error. I was walking one day along the common boundary between two reserved forests in the Palnis, the one protected against fire and the other burnt over every year. At this point both were grassy undulating slopes. The contrast was striking. The protected area presented a even surface of grass, admirably protecting the soil by its intricate net work of roots which held the soil particles firmly, and by the dense cover of grass blades and stems which prevented the rain from beating directly on the soil, like so many miniature shields and offered an obstruction to the heavy rush of water. On the other side of the narrow dividing line the grass grew very unevenly; it grew in clumps with spaces of bare soil of from several inches to about a foot and a half between. Most of these clumps were growing on small mounds well above the ground level. Moreover here and there in the burnt area appeared small outcrops of bare rock, a feature absent from the unburnt portion. What was happening was quite obvious; a very sad conversion was in progress. The grass being burnt off during the hot weather, the first showers

Harm of fire.

Harm done by fire in grass lands. Palnis.

found a bare soil with little to protect it from wash. The monsoon rains fell heavily directly upon the soil, wearing it away; the soil between the tussocks of grass was being eroded and the clumps were being thus isolated on small mounds. In course of time the clumps must be so isolated and undermined that they perish and are overturned by the rush of water or the feet of the cattle. And worse still, standing thus on small columns of earth the roots come more and more under the direct action of the annual fires, so that not only is the dry grass above ground burnt up but the roots themselves are killed.

Deterioration of grass.

In addition, though I must confess that the evidence is not yet quite complete, it seems beyond doubt that fires tend to coarsen the grass by killing out the finer, more delicate and more luscious kinds; the harder and coarser ones only surviving. In any case, it is obvious that the yield of grass on regularly burnt areas is diminished.

I repeat therefore, that the first step should be the exclusion of fires from the grazing grounds.

Other improvements.

Other measures of improvements may be in the direction of the extraction of useless and noxious weeds, the introduction of the best kinds of fodder grass, the extirpation of injurious animals and insects, the draining of swamps, the irrigation of the drier areas by running small irrigation ditches along the slopes from perennial streams, the improvement of watering places etc.

This could all be undertaken, under a proper system, by gradual stages by the herdsmen themselves during the long hours spent at present in idle gazing at the sky, or in sleep.

Trees in pastures.

The growth of scattered trees or groups of trees is very beneficial in pasture lands. As we have seen, trees moderate the extremes of temperature and cut off desiccating winds. In this way, as well as by the humus derived from their dead leaves, and by their action in increasing humidity, trees improve the quality of pastures and their yeild. Trees also afford shelter to the cattle from sun and rain. In any case, tree-growth should be maintained around the source of streams and the watering places.

Grazing Panchayats.

The management and improvement of the grazing grounds may well be left in the hands of the people themselves, where they are sufficiently alive to their own interests and where they are teachable. This indeed is the policy of Government in the establishment of forest panchayats, and it is the sincere wish of every Forest Officer that the system will meet with the largest measure of success, so that it may be extended to all parts of the Presidency.

There is no reason why, in the course of time, the villages should not possess their own forest areas for the supply of fuel and

Communal Forests.

small timber for their own needs, leaving to Government the duty of the management of the forests from which the commercial products on a large scale and the supply of large towns are to be extracted and also of the protection forests In France, Switzerland and Germany, there are many instances of such communal forests and they are frequently so profitable that not only do the villagers obtain their fuel and small timber free, but there is a surplus profit to be diverted to public uses, reducing local taxation and even in some cases freeing the people from the necessity of all such contributions.

Encouragement of Private Forests.

For my part, I would welcome more private forest enterprise in this country, provided that the private owners will see that their property is managed satisfactorily. With some noteworthy exceptions, too often private owners of forests are content to overexploit them for the immediate financial profit without regard to the future. They are blind to the fact that their property is being despoiled and ruined for long years to come. They do not pause to reflect on the gross injustice they are doing to those that will succeed them.

The creation of new forests and conservation of existing ones might well be encouraged by the State by exemption from land taxes until the forest begins to bring in revenue, by taxing those that do pay lightly and by making technical advice and assistance readily available. In other lands this and more is being done: bounties are offered, material financial assistance is granted, good seeds are distributed and plants are provided at cost price.

Madras Forests.

To give you some idea of the importance of the forests of the Madras Presidency, I may mention that on the 1st July 1915 the total area of reserved forests and lands stood at 19,639 square miles or 12½ million acres. Of course a very large proportion of this area is unproductive, being rock, or inaccessible or through other causes, and only a very small proportion is worked to anything like its full extent. Nevertheless, the gross revenue during the year 1914-1915 amounted to Rs. 40,17,852 the total expenditure was Rs. 29,36,651 leaving a net surplus of Rs. 10,81 201, Like other incomes, forest revenue suffered from the war conditions to a certain extent and the previous year the net revenue had been a little over 12 lakhs. The revenue from the forest is ever expanding with development and it will not be many years before the gross revenue expands to 50 lakhs.

Conclusion.

In concluding these remarks I need hardly state that it is not possible in 5 short lectures to expound to you the whole art and science of forestry; there is much that I have had to omit but I think that we have briefly covered the whole ground. In preparing these lectures I have been greatly assisted by a work by a distinguished French Forest Officer, called *La forét* or The forest, which has not yet appeared in an English translation; I can only recommend it at present therefore, to those who can read the French language. To any one who would care to enter into the subject in more detail I recommend

Volume I of Schlich's "Manual of Forestry",
Ribbentrop's "Forestry in British India",
Brown's "Sylviculture in the Tropics",
G. P. Marsh's "Man and Nature".

On the Management of Village Forests.

Winning Essay for the Chief Conservator's prize of Rs. 30
—By, M. R. Ry. A. Siddan Pillai, Range Officer.

To find a solution to the problem of managing the grazing reserves, and the poorer fuel forests after these unfortunate areas are removed from the hands of their dear mother, the Forest Department, and handed over to a nurse who, I am sure, will be a novice in the art of managing them, requires a searching scrutiny of the materials available for management. Evidently, constant resolutions in the local Legislative Council have been passed pressing on the Government to transfer the control of the Reserves to the hands of the Local Panchayats on whom the movers of the resolution are keeping implicit faith to possess a capacity for efficiently managing these forests. The Government in their turn have naturally to consult the Forest Department to devise a means of control. The necessity for such a step on the part of the Government is, I believe, the prevailing hatred of the people against the Forest subordinate officials. The general public had hardly appreciated the sincere hard work of the Forest Department whose tedious labour is unknown to them. So long as the masses remain uneducated so long will the Forest conservancy be hardly realised by them. Some years ago the people of Madura District condemned the system of the management of the Fuel Depots by the Forest Department, and loudly demanded its replacement by a contract system. Shortly after the introduction of this system, the middle man, the contractor paid his own wages for the extraction of fuel and fixed his own price in the market. The public in a short time keenly felt the arbitration of the transition and again demanded back the original Departmental control. The Government could not pursue a weather-cock policy and therefore stood silent. It is still an unsettled fact that a change has taken place in the minds of the people to render mutual help. Trial has already been given by the Government by handing over, in some Districts, the V and VI class Forests to Village Panchayats controlled by the Revenue Department. Provisions have also been made that Officers of the Forest Department of and above the rank of Ranger can inspect such Panchayat areas and offer their remarks on the management. Unfortunately experience has shown that the management in several cases is a failure and the poorer ryot in the village is undergoing greater hardship under the hands of the Panchayatdars than under the so-called irresponsible Forest sudordinates. For, I have personal knowledge of some of the Panchayat areas in Guntur District where the influential ryots composing the Panchayat do not allow proportionate concessions to the poorer classes in the matter of grazing and collection of dried fuel. Many a ryot of the poorer classes had approached me, and complained that any hardship or injustice created by the Forest Department subordinate could be remedied by appealing to the Superior Officers in the Department ; whereas if any hardship is created by the Panchayatdar the poorer ryot is unable to complain against the Panchayatdar who certainly by virtue of his being influential will retaliate the complainant with a greater hardship (on the poor ryot.) Practically the Panchayat areas are ruled by the village munsiff of the village and the Revenue Inspector having jurisdiction over that village.

The status of these officers is in no way above that of a Forest Guard or Forester respectively. If the subordinate officials in the Forest Department are said to be unscrupulous in the exercise of their duties equally so could be said of the petty Revenue Officials. At least the Forest subordinate by virtue of his training in the Forest school can be said to feel generally his responsibility to maintain and better the condition of the conservancy of the Forest areas; whereas the Revenue official referred to is generally ignorant of any sylvicultural knowledge, and therefore could not be expected is a failure and the poorer ryot in the village is undergoing greater hardship under the hands of the Panchayatdars than under the so-called irresponsible Forest sudordinates. For, I have personal knowledge of some of the Panchayat areas in Guntur District where the influential ryots composing the Panchayat do not allow proportionate concessions to the poorer classes in the matter of grazing and collection of dried fuel. Many a ryot of the poorer classes had approached me, and complained that any hardship or injustice created by the Forest Department subordinate could be remedied by appealing to the Superior Officers in the Department ; whereas if any hardship is created by the Panchayatdar the poorer ryot is unable to complain against the Panchayatdar who certainly by virtue of his being influential will retaliate the complainant with a greater hardship (on the poor ryot.) Practically the Panchayat areas are ruled by the village munsiff of the village and the Revenue Inspector having jurisdiction over that village.

The status of these officers is in no way above that of a Forest Guard or Forester respectively. If the subordinate officials in the Forest Department are said to be unscrupulous in the exercise of their duties equally so could be said of the petty Revenue Officials. At least the Forest subordinate by virtue of his training in the Forest school can be said to feel generally his responsibility to maintain and better the condition of the conservancy of the Forest areas; whereas the Revenue official referred to is generally ignorant of any sylvicultural knowledge, and therefore could not be expected obligations as well besides enjoying privileges. For at the onset, if proper control is not exercised by introducing suitable and practical conditions we will be allowing the people to destroy the sources for good grazing and supply of firewood. As one having some knowledge of the kancha system in Nellore District, any scheme proposed to control the minor reserves by an alien body can be certainly said to be an improvement over the existing kancha system which is expected to develop into a spontaneous growth of Panchayat system. Under the Permit system, the grazing revenue was collected directly by the department from the graziers, and the concerned subordinate official held responsible over any illicit grazing or brousing, i. e. the entire responsibility and control was in the hands of the Department. Under the kancha system the grazing areas are being leased out to a middle man known as Kanchadar who pays the full lease amount, and who is held responsible for any illicit grazing or brousing and for illicit fellings. He is also held responsible to maintain the existing boundary lines and cairns in good condition. This system however does not preclude the Forest subordinate from similar responsibilities Thus the kancha system is a distinct improvement over the permit system, and its management is a combined responsibility of a private body and the Forest subordinate. And any improvement over this kancha system is a corrollary in which if the joint responsibility of the Forest subordinates is removed, it precipitates in the leaving of the area under the sole management of a private body. This body may be styled as the village Panchayat and kept under the direct control of the Revenue Department.

The Panchayat will have under its control the area of Forests (minor reserves) lying within the limits of the village to which the Panchayat belongs. The Panchayat may be an elected or a nominated body according as the village contains advanced or backward village folks. The election or nomination may be performed by a Revenue Divisional Officer assisted by a Gazetted officer of the Forest Department having sufficient experience in his official career. The Village Munsiff of the concerned village must be a member in the Panchayat. The Panchayat should be asked to pay a lump sum amount to the state for the privileges it enjoys. The maximum rate may not be fixed at more than Rs. 0-4-0 per acre. The portion of the amount realized may be re-imbursed to the Panchayat for improving water supply and maintenance of boundary marks. Goat brousing should be strictly prohibited; collection of dry fuel throughout the area may be allowed. The whole area under each Panchayat may be divided into 25 coupes of equal areas and the Panchayat may be allowed to fell each coupe annually on simple coppice system and the fuel extracted may be utilized for the local consumption. Under no circumstances should the fuel be sold to any outsider other than included in the Panchayat. The cutting of trees close to the ground should be insisted on. The felled coupe may be closed for a period of 3 to 5 years according to the development of the coppice shoots. Here a sylviculture method is adopted, and the method though simple and could be understood by any common village folk still is foreign to the new body. To educate the Panchayat in the new method, a Forest Officer is necessary. A trained Forest Ranger of not less than 5 years experience (as Ranger) may be attached to each Revenue District since the village Panchayat is to work under the direct control of the Revenue Department. The Ranger so appointed will be under the direct control of the District Collector.

During his tour he must be asked to inspect the areas along with the local Revenue Inspector and the Panchayatdars, so that the Revenue Inspector and the Panchayatdars can be educated in sylviculture method. Any wilful irregularities committed by the Panchayat will be taken to the notice of the Revenue Divisional officer having jurisdiction over the Panchayat. Any individaul grievance against the Panchayat may be put forth before the Revenue Divisional Officer and remedy obtained. I am sure within a period of 5 years, the Panchayatdars can be trained in the art of managing the small reserves under their control and then the Special Ranger attached to the District may be withdrawn. May God save these poor Minor Forests during the transition period under the control of a new body bereft of all exercise by the Forest Department.

"The Sandal Tree."

Fourth Essay for the Indian Forester Prize for 1923 for M. F. C. Students.—By S. Rangasami.

The Legislative Assembly has of late referred to the forests of India as "Gold Mines". This recognition of the value of forests is specially applicable to the Sandal Forests of the Madras Presidency, where the revenue from sandal alone is no less than 5½ lakhs of rupees per annum out of a total Revenue of about 52 lakhs; in other words, more than 10 per cent of the Revenue of Madras forests comes from sandal.

In commerce there are three kinds of sadalwood, the white, the yellow and the red. The last is obtained from *Pterocarpus Santalinus* (Red Sanders) and the first two from *Santalum Album*. The latter is a moderate sized tree 20 to 40 feet high with numerous branches forming more or less spherical crowns. Leaves are opposite, oblong or ovate oblong, 1½″ to 2½″ long; Flowers brownish purple in axillary or terminal panicled cymes: perianth campanulate; limb, of four, valvate, triangular segments, stamens four, exserted alternating with four rounded obtuse scales; fruit round, smooth and black when ripe, succulent, with a persistent calyx.

It grows in India, Assam, China, and Cochin-China, in many of the islands of Eastern Archipilago and in the tropical parts of Australia. The white sandal is a native of Malabar, Coimbatore

Salem, Madras and Mysore. The best wood is obtained from Mysore and the white wood is simply the outer covering of the reddish coloured heartwood. It is hard, heavy, and takes a good polish. This white wood is largely used for making toys in the Tanjore District, as the trees easily get to nearly four feet girth without forming heartwood. The yellow and the brownish wood are obtained from the heartwood of the tree and are highly valued. The yellow wood is popularly known as the "Female Wood" and even some educated people think it a distinctly separate class of wood and go in for the same. But the yellow variety is really nothing but an immature wood, as all the green trees, I have extracted, yield this variety. The older the tree the greater is the fragrance and hence the reddish wood obtained from dead trees is highly scented, whereas the yellow wood gives only a mild smell. The strong smell is due to the presence of an oil, the quality of which depends on the soil on which the tree grows. The wood is hard, takes a good polish and is well adapted for carving, turning etc. The wood is also used for burning the dead, and high caste Hindus purchase it in large quantities for this purpose. It is also used to form the sectarian marks on the foreheads of certain caste Hindus. It has a bitterish aromatic taste and the powder possesses sedative and refrigerant properties and hence burnt in Hindu houses. A mixture of this with cocoanut water quenches thirst and is also used as a medicine in fevers, headaches and bilious affetcions. As an incense it is used largely by Mahomedans. The "Joss Sticks" or "Oodu Batties" are prepared by spreading a thick paste of sandal on slender sticks of bamboos and these are burnt in every household to dispel noxious insects, and also as a perfume. The oil usually distilled from the rootwood is often used to adulterate Rose Attar.

The age of maturity is estimated to be 50 years and the tree should be uprooted just before attaining maturity. As a timber, it is subjected to heartshake only, but under very rare circumstances cupshakes too are formed. The low caste people chew the bark with betels as a substitute for arecanut, and for this the bark is stripped in several localities. It was noticed by me in Salem District, but steps were immediately taken to stop it.

Sandal grows well at an elevation of 2000 to 4000 feet and hence Mysore produces the best wood. The second factor which tends to the production of good wood is the soil which should be neither too rich nor too poor. A rich soil produces a very good growth with no heartwood; e. g. Sandalwood on the Cauvery banks of the Tanjore District. Sandalwood grows freely in all parts of Bombay especially in waste gardens and grass preserves. In the Darwar Collectorate, Mr. Edward Balfour says, that there are 1,53,000 trees but recently a Patta Sandalwood merchant of Thally who purchased about 500 trees says that the yield was only 2 to 3 tons. Whereas the same number of trees in Denkanikota Range has yielded about 6 or 7 tons. This shows the value of the soil on which the tree grows. The best soil is a fair, brown sandy gravelly soil. Sandalwood growing on rocky mountains contains the greatest quantity of oil.

Regeneration.

The regeneration of sandal is only natural but at present the Forest Department is trying artificial regeneration which is done in two ways either broadcast or in nurseries and afterwards transplanting. In broadcast sowings no transplanting is made. In both the cases, to avoid seeds being eaten away by rats aud squirrels, the seeds are poisoned with red Oxide of Mercury. They are soaked for three hours in a solution prepared by mixing 10 grains of oxide with 2 oz. of water for every 200 seeds, are then taken out and spread on the ground. When dry, they are taken out for sowing. In broadcast sowings, small pits are made under the bushes and 2 to 3 seeds are sown in each pit. As sandal is a root parasite, it is always essential to sow them under some bushes. Sowings are done in the month of May or June so that the seeds may remain underground for about a month before rains. In the case of plantations, nursery beds are selected near water and the soil should be composed of a mixture of sand and vegetable mould and ashes to avoid ants etc. The seeds are first sown in heaps. After germination, they are planted in lines 4" apart and 3" from each other. As sandal is unable to bear much direct light in its seedling stages, some sort of light pandal should be erected. When the plants are 6" high they should be lifted, the taproots should be cut back to 4" and then replanted in the beds 6″ apart. When the plants are 9″ to 12″ in height pits are dug 1½′ square in which the plantation is made. For the first year shade should be provided for, and the plants should be watered frequently. Great care should be taken to protect the seedlings from deer and goats. A good fence should be erected all round. As straight and sound billets of sandal are valued more than the crooked ones, our aim should be to rear the trees as straight as possible and so all side branches should be pruned off carefully so as not to cause any rot which will otherwise very much reduce the value of the wood.

If the trees are planted so as not to injure the root system, no watering will be required in the second year. As sandal is parasitic, some host plants should be planted side by side with sandal and it is better to select some fast growing species as hosts. Generally Acacias and Albizzias serve the purpose best. After five to six years only, slight assistance, such as, clearing the heads of young plants which are often suppressed by creepers is necessary. The tree is fit to be felled between 35 to 45 years after which time it becomes hollow. In stony soils, the sandal attains only 6″ to 8″ in girth but it contains more oil and the wood is more close grained, harder and denser than the large ones. The heartwood of these small trees is dark in colour. Another danger to sandal is theft and for this vigilant supervision of the local officers is necessary.

Extraction of Sandal.

As the sandal roots are valued more than the billets, it is always the custom to uproot the trees entirely. A deep trench is cut all round each tree and the side roots are cut, so that the tree falls of its own accord. All roots containing more than the size of a rupee of heartwood are extracted. The trees are rough cleaned leaving only a thin layer of sapwood. They are then transported to the Central Depot where the trees are billetted, rootwood and stemwood separately. The maximum length of billets is 3 ft. The final cleaned billets and roots are then numbered, hammer marked on all sawn and cut edges, weighed, packed in gunnies and despatched to the Sale Depot. The wood is then classified into 18 classes and each class auctioned separately. The average price realised in the past six years is Rs. 19 per maund.

Unfortuunately my favourite tree has of late become subject to a peculiar disease known as "Spike." The first report, received in December 1899, shows that the disease must have been in existence, long before this time and that it originated in Mysore. The disease is of two kinds—longleaved and shortleaved. At Royakota in North Salem, the tree showed lengthening of the leaves and internodes and it is only in its latest stages that clustering was seen. "Mr. Hearsey made some important observations," says Mr. Lushington "showing thereby that it is an early form of spike by having found it associated with abnormal flowers and tree spike." In the true spike the leaves gradually decrease in size, arrangement varies from opposite to alternate and then to verticillate in threes and fours. The leaves get thickened, brittle and break with a snap. The colour turns pale and yellowish. In due course the thickened leaves become crinkled and the trees shed their leaves far too often. The leaves shed are quite green, healthy and immature. The fall of leaves is immediately replaced by new ones, smaller and narrower in size which gradually become thickened and fall off. The flowers become abnormal and the floral parts get more or less modified into leaves, the phenomenon being called "phyllody." The tree becomes stagheaded and a number of bugs and insects occupy it in its later stages. It gradually dies and when dead is fully covered up with a thick hairy growth. The rootends of a spiked tree, examined by me were also found to be dead.

Several experts are working hard to find out the root cause of the disease Some are of opinion that the disease is due to insect attack.

Others hold that the disease is due to the presence of Lantana. This seems to be true when we see the virulent "spike" in the thick Lantana jungles of Javalagiri spike areas of Denkanikota Range.

A third theory is that the disease is due to an unbalanced sap circulation. If water supply is gradually reduced below that which is required for a balanced circulation, the sap circulation becomes unbalanced and an accumulation of starch in the leaves and twigs will result, thus gradually cutting off the food supply necessary for the health of the roots. If this last condition is sufficiently prolonged, it is believed that it will cause the disease known as "spike."

There are various other theories which I have no space to put forward in this essay. Anyhow no final conclusion is yet arrived and the disease is spreading on unabated. Innumerable seedlings and saplings are killed every year thus creating a great loss.

"Ora et labora"

Note on Parlakimidi Forests.

The Parlakimidi Maliahs were originally part of the estate of the Rajah of Parlakimidi, but were taken over by Government after the Parlakimidi rebellion, and are inhabited by an aboriginal race of people known as Savaras. In time past the Savaras made a practice of descending upon the plains and taking toll from the unwarlike Uriyas of the Ganjam plains, which caused the old Rajahs of Parlakimidi to set up a series of Forts in the Maliahs. Each Fort was placed in charge of an Uriya chieftain, known as a Bissoyi, and he had under him a body of Uriya irregular levies. His sergeants were called "Hodadars" and his rank and file were "Paikos". Their duties were to control the Savaras, and to prevent incursions from the hills into the Plains. In return each Bissoyi was allowed more or less what he could get from the Savaras in the way of "Mamuls". It is not to be supposed that these Bissoyis got much in the days when the Savara was still a fierce and untamed warrior, but as the people grew more amenable to control, their perquisites must have gradually increased.

When the British Government assumed control of the Parlakimidi Maliahs, they found the country split up into ten or twelve muttahs, each with a Fort, and in each Fort a Bissoyi with his attendant Hodadars and Paiks, and this is so up to the present. No longer are the Bissoyis and their Paiks called upon, in practice, to keep the Savaras in order, because the Savaras have long ceased to raid the Plains, but still the mamuls persist.

One or more paiks (or a Hodadar) is allotted to each Savara village, and their function is to exact a living from the Savaras of that village. Similarly, each Savara villages makes a present to the Bissoyi every year:

In addition to these mamuls, every Bissoyi, Hodadar and Paik has inam lands attached to his post in the Fort village.

From time to time, efforts have been made by Government to fix these mamuls with a view to prevent degeneration from mamuls to exactions and the latest attempt aimed at converting mamuls paid in kind into cash payments. It is my belief that this is a mistake, and I am not sure that the idea has not been dropped.

2. *The country*:—To understand the problem it is necessary to have some idea of the country. The country is divided into 2 halves by the Rayagada valley. The Northern half is dominated by the Mahendra range (4900Ft) and the Southern by the Devagiri range (4800 Ft). Leading from these are a series of minor

ranges. All these ranges have the same general features—precipitous hill sides and deep and narrow valleys. In every valley there is a small stream rushing between rocky boulders, and the hills themselves are boulder strewn and jungle clad. These hills form an important catchment area for the Mahendra Panya (Daughter of Mahendra), which is a tributary of the Vamsadhara River, and also for several tributaries of the Langulya; which two rivers play an important part in the irrigation of the Chicacole and Vizianagaram divisions of Vizagapatam District.

3. *The people*:—The Savaras are an industrious, childish people; quick tempered, but essentially happy folk. Their main characteristic, however, is their childishness—as demonstrated by their frank curiosity, and their natural veracity. I speak of the real Savara of the interior, who has not yet been influenced by intercourse with the more sophisticated Uriya of the plains.

Their main source of livelihood is cultivation. They show extraordinary ability and industry in revetting hill streams in these precipitous valleys. A feature of the country is the spectacle of paddy grown at 3 or 4 thousand feet up a mountain side. The stones are there to their hands, but their skill and industry in practically making land is truly remarkable. Unfortunately, the valleys are few, and the steep hill sides are many. Consequently, the great majority of Savaras earn their living by Podu on the hill sides. They select a patch of steep rocky hill side, usually high up on the hill, where the undergrowth and tree growth is thickest. They first cut down all the trees (Every Savara carries an axe (or tangi), and is an expert wood cutter. I was assured that 2 men could fell an acre of forest in one day. Having cut down the trees in the area selected, they let them dry in the sun for some time. Then one night, they start a semi-circular fire with the wind behind which consumes all the smaller branches and undergrowth in the area. In this again, they are expert. Seldom or never do these fires get beyond their control. The larger tree trunks are left lying on the ground. The land is then left until it has cooled, and with the first rains, they sow their millet and cholam and other dry grains. No other preparation of the land is made. The seed sown takes root in the ashes, and in such soil as there is in the crevices between boulders. Anyone seeing for the first time a podu field ready for sowing, would "deny with oaths" that anything could grow on that sea of stones and boulders.

The results:—We have seen that their cultivation expenses are nil. No ploughing is necessary, and no manuring is called for. The resultant crop is truly amazing. The yield of cholam from an acre of podu is 50% better than the yield from a well-prepared, manured and irrigated field of average dry land. The reason of course is that what soil there is the very richest quality, and is really intensively manured.

The advantages to the Savara are that cultivation costs him nothing, except a very little labour. He has no cattle to feed all the year round. His gross yield is also his net gain.

But, what are the results to the country side generally? When the heavy rains come, most of the earth that remains in the crevices of the boulders is washed down into the valleys and thence the rivers take it swiftly into the sea. Regeneration of the forest growth is retarded next year. The process, of course, is cumulative. The same podu area is cultivated for 2 successive years and sometimes for three:

Consider the effect of this podu, if it is extensively carried on in country such as I have described; Consider also that the area is small, and that the Savaras are many. The inevitable result of unrestricted podu is that the hillsides, which are mostly precipitous, become bare, and even the boulders disappear, leaving the solid rock exposed. It is a Law of nature that you cannot get something for nothing. Unrestricted podu is suicidal on the end. It would not, perhaps, be such a serious evil, if the Savaras ruined themselves by impoverishing their home lands but the denudation of these hills means a serious loss to the plainsmen: If the hillsides are denuded of vegetation, all springs must dry up, all perennial streams must become mere drains useful only for carrying the water that falls on the hills into the sea; where there is already an adequate supply. Assuming, that the savara is entitled to commit suicide by his uneconomic habits, would we be justified in allowing him to deprive his plodding brother, (the Uriya plainsman) of a constant flow of water for his thirsty fields?

It was for this reason that Government decided some 20 years ago, that it was necessary to do something for the forests on these hills in order to save the Savaras from themselves, and the adjoining plainsmen from the Savaras. It was decided to reserve some of the area. A preliminary survey was held by Mr. Cox, late Chief Conservator of Forests. The next step was to find an officer to carry out the proposals of Mr. Cox. Trouble was anticipated from the Savaras. It was obvious that they would not tamely submit to a sudden curtailment of their old privileges. Well might they have said "Robbery and Podu were our prerogatives in the good old days. First, you stop robbery, and now you want to stop Podu. What is left for us except to starve?" Persuasion was no good; they are incapable of understanding that reservation is meant for their benefit. Meantime, it was necessary to find a man to carry out this difficult task of reservation. Mr. Welchman was appointed as special forest officer. He had no special qualifications as a Forest Officer, but he had every other qualification. In a few years, he won the confidence of the Savaras, and was able to do anything with them. He became one of their Gods. To this day, the Savaras do not believe that he is dead, and his name is still a household word with them. He had trouble at first, but by his unbounded tact, and by his wonderful personality, he finally won them over.

His very success in winning the Savaras, led to his making a mistake. He ended by reserving some hills that were not recommended and by not reserving (because he had no time) some important hills that were recommended by Mr. Cox. He achieved marvels in a short space, and many a hillside that was bare and nearly "done for" when he first went there, is now respectably clothed and restored to a condition of usefulness. But he left a legacy of trouble for his successors, for his work was unfinished. With the removal of his personality (by death during the war), the Savaras would have no more reservation. They were even tempted to defy authority, and to revert to podu in lands already reserved. There was grave risk of a Savara rising in 1922, but some concessions were promptly shown to them, and the agitation died down.

The problem of forest reservation in these hills is as follows:—

The forests are unproductive and worthless as forests. They are only useful to protect water sources, and to preserve a fuel supply for the plains. The Savaras cannot support themselves on the country that remains to them after reservation. In the hot months they starve, and subsist on roots and mohwa flowers. It is a great strain on them to have to refrain from podu in the reserves, which are now well-worth podu-ing, and form a standing temptation to people with their habits.

The Savaras are secretly encouraged by the Uriya Paikos to podu in the reserves, because the more the Savaras have, the more there is for the paikos to take away.

In granting concessions to the Savaras in 1922, they were given fringes of the reserves—enough to make up 10 acres of hill side for every household to podu. But, 10 acres is not enough in this country. Hence my own opinion is that these concessions will only temporarily keep them quiet. On the other hand, the area at present under reservation is a minimum.

The solution of the problem, in my opinion, lies in 2 directions.

(a) Handing over the management of these reserves to the Bissoyis.

(b) Encouragement of emigration of Savaras to Assam; where the nature of the country is much the same as in their maliahs.

W. O. NEWSAM. I. C. S.

Regeneration operation at Dhoni.

The Dhoni forests occupy the flanks and ridges of a chain of low steep hills situated some miles south of Olavakot.

The bulk of these forests were originally the property of the Chenat Nair family and became escheated to Government when the last Nair died intestate, some years ago.

The elevation varies from about 1500 to 3000 feet, and the working is at present confined to the accessible areas at about 2000 feet elevation.

The soil is a clayey loam with a large admixture of humus. It is very shallow on the ridges and outer slopes and very deep in the inner valleys. The slopes are precipitous and the steep ridges are often covered with large masses of sheet rock mostly granitic in composition.

The climate is hot and dry from December to May, but there is a great quantity of dew in December and March. The N. E. monsoon from the Bay of Bengal coming through the Palghat Gap is felt during this season. The S. W. monsoon commences in June and lasts till December, and is accompanied dy torrential rains, the average annual rainfal being over 150 inches.

Three district zones of vegetation are to be observed here. On the outer slopes we find the deciduous forests of *Dalbergia latifolia*, *Terminalia tomentosa*, *Anogeissusa latifolia*, and their usual associates. The underwood consists of *Acacia Pennata*, *Triumfetta rhomboidea*, *Helicteres Isora etc*.

The second zone of vegetation represents the point where the evergreen and the deciduous types meet and merge one into the other. Here both semi-evergreen and semi deciduous trees grow side by side. The overwood consists of *Xylia*, *Terminalia*, *Myristica*, *Hopea*, *Artocarpus hirsuta etc*. while the undergrowth consists of several varieties of very poisonous nettle, *Clerodendron serratum*, *Croton malabaricum* etc. Creepers and climbers are found in great profusion.

The evergreen zone occupies the upper valleys. The soil is deep and rich and the trees attain large dimensions. The overwood consists of Poon, *Mesua*, *Cullenia*, *Dichopsis*, *Bischoffia* etc., while the underwood consists of several species of *Diospyros*, *Garcinia* and other species. Canes & palms ~~Caves and plains~~ abound in exposed localities-

The necessity for artificial regeneration arises from the fact that the system of exploitation at present adopted is that of clear cutting, and it is surprising to find that up to about two years ago, no extensive regeneration operations seem to have been carried out. True enough, some years ago there were some spasmodic attempts to raise teak on the outer slopes, but how miserably this has failed may be deduced from a visit to these areas at the foot of the ghat. The works of regenaration are in the hands of the D. F. O., and the regular establishment. The whole area has for this purpose been classified into Dry, medium and wet; "Dry" areas being those in which the growth is deciduous, "medium" being those in which the deciduous merges into the evergreen, and "wet" being those in which evergreen, species grow. Several experiments in regeneration are being conducted by the Research staff in different areas in order to find the species best suited for each locality, but as they are in a comparatively early stage, it is at present impossible to deduce anything conclusive from them, though they are helpful in a degree in that they enable us to determine the best methods of regeneration suited to certain areas and to certain species.

Regeneration operations on a large scale have been carried out both in "dry" and "medium" areas of which coupes XI and XII in the Sappal valley may be taken as characteristic of the one, and the "Naickenparai" "medium" area of the other.

Coupes XI and XII of the Chenat Nair Reserve originally contained a deciduous crop of *Terminalia paniculata*, *Terminalia tomentosa*, *Xylia xylocarpa*, *Dalbergia latifolia* and of other deciduous species, which were mainly cut out by the contractors to whom the coupes were sold for fuel.

Five years ago these slopes were planted with teak, but teak died out as the soil was sandy and shallow and held very little moisture during the dry weather.

In 1921, ten thousand plants of *Swietenia macrophylla* were put out and now only about a thousand of these remain. Although they came up well enough they were very largely killed out last hot weather. In the same year, an attempt was made to regenerate these slopes with Hopea and Aini, but the result was a total failure not understandable in the case of *Artocarpus hirsuta*, as this species is found here growing naturally.

Last year, the species found previously growing naturally in the locality were taken into consideration, and attempts were made to regenerate *Xylia* and *Terminalia tomentosa*.

Lines 6' apart were cut straight down-hill on the slopes, staked every six feet and dibbled with seeds. The drier hotter, and more open places were sown with *Xylia,* while where growth was thick tunnels were cut and *Terminalia* seeds put in. The seeds germinated fairly well but an extra-ordinary heavy monsoon killed off all the plants, only about 10% or less being now left *Xylia* originally formed 50% of the crop and there appears to be no reason for its failure. It is a noticeable fact that natural seedlings of *Xylia* found on the ground were not affected by the monsoon. It is probable that the putting of Xylia in the open accounts for its failure, as Xylia seedlings are found growing naturally under shade.

Terminalia, though put in three times during the monsoon has failed utterly, presumably because there was too much shade.

In these areas, the great difficulty to be met with in regeneration appears to be to regulate the shade conditions over the seedlings.

A certain amount of shade becomes absolutely necessary during the hot weather, but with the advent of the monsoon, the shade thus left grows abnormally and tends to crowd out the seedlings.

The heavy monsoon rains also tend to drown or wash away the seedlings while the ensuing drought puts the finishing touch to the work of destruction by drying up the seedlings.

Under these circumstances it is obviously impossible to try artificial regeneration with any success, and natural regeneration has to be relied upon. There nature seems to favour us. There is some Xylia and a lot of *Terminalia paniculata* natural regeneration on the area while root suckers of *Dalbergia latifolia* are also met with. We also find copious regeneration of *Pterocarpus marsupium* round a parent tree, and there appears to be no reason why, given time, the hill-sides should not clothe themselves with as good forest growth as was on them before. At the same time it is probable that good seeds of Xylia if put under shade will also do well.

In the *Naicken-parai* "medium" area, Hopea and Ainee have been tried.

The Hopea seed used appears to have been bad and of doubtful fertility, and, as a result although a great many seeds germinated, the small seedlings did not possess enough vitality to carry them beyond the germination stage. Even under these circumstances the regeneration appears passable on the whole, but whether they will survive the present hot-weather is a matter for doubt.

The Aini regeneration is good on the whole, and the seedlings look healthy and promising.

and that if inappreciable errors of 1/8 of a degree are committed in taking readings at 10 stations, they will accumulate to an error of 1·25°. So such errors though deplorable in theory cannot be helped in practice. Further if in plotting, the traverse does not close on account of this error, and if this small error of closing is distributed between all the 31 sides, it would not be appreciable at all and the plotting would be correct.

If there is only one source of local attraction, then as we proceed from, station I. the discrepancies ought to gradually increase towards the middle of the traverse and then diminish gradually into a vanishing point when we come back again to the starting station. On the whole, we find such a phenomenon in the present instance, the discrepancy rising from·5° at the 2nd station to 15.5° at 23rd station and diminishing up to 1·25° at the last station. But at 3 places i. e., at stations 14, 24 and 28 we find variations from this expected result. This may either be due to readings being recorded wrongly at those 3 stations or to there being more than one source of local attraction This of course is rather beside the point for, practical purposes. What is of importance is the fact that by making use of the method explained here and in the previous article an "unplottable" field book is converted into a "plottable" one.

One thing to be remembered in making use of this method is to record the exact readings (both back and forward) that one gets however slight the discrepancies might be and not overlook such discrepancies and write them down as one expects them to be.

Prismatic Compass Survey.

The field book promised in the last issue of the magazine is published below. A glance at the actual readings obtained in the field shows that the back bearings rarely tally with the corresponding forward-bearings. The discrepancy is as much as 9° between stations 26 and 27. It is absolutely useless to plot such a field book. So the method explained in the last issue of the magazine is made use of to derive correct readings and the same are recorded side by side with the actual incorrect bearings. Between the two are recorded the discrepancies. These discrepancies are not those between actual forward and actual back bearings; but they are those between derived forward bearings and actual back-bearings. For example the derived forward bearing from station 19 is 316·5°. If there were no local attraction at station 20 the actual back-bearing from there should be 316·5° minus 180° = 136·5°; but the actual back-bearing is 146·5° which is 10° more than what it ought to be. So a discrepancy of **(+10°)** is deducted from the actual forward bearing from station 20 which is 355° and the balance of 345° is put down as the derived forward bearing from station 20. In this way all the incorrect forward bearings are corrected.

It is assumed that there is no local attraction at station 1. So the actual back-bearing from that should have tallied with the derived forward bearing from the last station 31. But we find a discrepancy of 1·25 (359·5 minus 358·25) which must be due to unavoidable errors committed in taking reading in the course of the survey; because it must be realised that there are 31 sides for the traverse, that readings can be taken only correct to quarter of a degree, and that if inappreciable errors of 1/8 of a degree are committed in taking readings at 10 stations, they will accumulate to an error of 1·25°. So such errors though deplorable in theory cannot be helped in practice. Further if in plotting, the traverse does not close on account of this error, and if this small error of closing is distributed between all the 31 sides, it would not be appreciable at all and the plotting would be correct.

If there is only one source of local attraction, then as we proceed from, station I. the discrepancies ought to gradually increase towards the middle of the traverse and then diminish gradually into a vanishing point when we come back again to the starting station. On the whole, we find such a phenomenon in the present instance, the discrepancy rising from·5° at the 2nd station to 15.5° at 23rd station and diminishing up to 1·25° at the last station. But at 3 places i. e., at stations 14, 24 and 28 we find variations from this expected result. This may either be due to readings being recorded wrongly at those 3 stations or to there being more than one source of local attraction This of course is rather beside the point for, practical purposes. What is of importance is the fact that by making use of the method explained here and in the previous article an "unplottable" field book is converted into a "plottable" one.

One thing to be remembered in making use of this method is to record the exact readings (both back and forward) that one gets however slight the discrepancies might be and not overlook such discrepancies and write them down as one expects them to be.

	Actual Bearings.	Descrepancy between the Actual and correct Bk. Bg.	Derived Bearings.		Remarks.
Starting pt.	**1**		**1**	S. W. Corner of Coupe II.	
Bk. Bg.	359.5° 222		359.5 222	to st. 31.	Actual back bearing.
Fd Bg.	179.75°	minus (+1.5°)=	178.25°	to st. 1	Original Starting pt.
	31		**31**		
Bk. Bg.	354.25° 221		352.75° 221	to st. 30	
Fd. Bg.	174 5°	minus (+1 75°)=	172.75°	to st. 31.	
	30		**30**		
Bk Bg.	1.25° 536		359.5° 536	to st. 29.	
Fd. Bg.	181.75°	minus (+2.25°)=	179.50	to st. 30.	
	29		**29**		

Exploitation in Dhoni valley.

We have heard much concerning Dhoni recently and it might be of interest to trace generally the system of exploitation there.

Dhoni valley is about the largest and the most important of a series of closely situated abruptly steep valleys in the Western Ghats which are clothed with dense evergreen timber trees. Timber extraction is extremely difficult in these precipitous areas and it is sought to briefly narrate how this task is accomplished.

For about 5 months in the year no work is possible because of the heavy Monsoon rains and thus extraction has to be speeded up during the remaining seven months. It would not be possible to extract the timber by means of bullock transport, although this method is extensively used in conjunction with more modern methods.

There is a good metalled road from Olavakkot to the foot of the hills and from there the course of carts up hill is along a good hill cart road for 3½ miles to Naikanparai which is the limit for carts. From Naikanparai for about ½ a mile there is a well graded pole road to the chief yarding station, to which a tractor yards the timber brought down from the felling areas either by men or buffaloes. This is the main route of exploitation, and various minor drag paths, etc, join up with it.

When an area has been chosen for expliotation (I do not think tere is any particular order in which areas are being worked) a thorough girth class enumeration is made of all species in the area of and above the exploitable size (28" girth) and an estimate of the yield formed thereon. It then remains for the surveyor to run over the area and make a detailed contour map showing with a certain degree of minuteness the lie of the country so that, when the exploitation officer gets this map, he may ascertain the most suitable yarding stations and the best routes of transport to the Naikanparai Road.

In felling trees the Malabar axe and the cross cut saw are used; the direction in which the tree is to fall having been settled, the axeman makes a deep cut extending nearly to half the thickness of the tree on that side of the tree to which it is to fall and then a couple of men saw it down from the other side. A bottle of kerosene is always kept handy for use when sawing down resinous trees like *Mesua*. A set of 3 men work together on a contract rate of 0-0-5 per c.ft of sound timber felled. When a sufficient number of logs, which are usually about 20' long, are got ready they are rolled by levers to the nearest drag path from whence they are dragged by coolies within reach of the tractor.

A path nearly six feet wide cleared of all growth and boulders etc. with a maximum gradient of 1 in 7 forms a drag path. It usually follows a contour for some distance in order to cover a greater area and thereby giving access to a larger number of logs.

In gangs of 20 with a maistry in charge, the coolies pull on ropes tied to the eyes of 2 strong dog spikes which are driven into the log to be transported. Very often they transport from the felling area not more than 100 c.ft per day over a small distance of about 100 to 150 yards which, however, may be very steep and difficult ground. In places where drag paths are not very steep two or four buffaloes in pairs yoked together, drag small logs much more quickly than the coolies do, but, their maintenance is high. When the logs are brought within reach of the stationary winch tractor, they are easily and quickly hauled to the head of the pole road by wire rope working over a drum, and one or two pulleys as the case may be. The tractor has of course to be anchored behind to prevent it creeping towards the logs hauled.

The pole road or skid road extends to about $\frac{3}{4}$ mile from the main yarding station to Naikenparai.

This road is a modified form of dry slide. The gradient is about 1 in 6 and the velocity of the logs travelling on it is reduced here and there by much gentler gradients. It is constructed to transport logs of and less than 3 feet in diameter.

A road surface with the gradient fixed is made and over it are placed crosswise, round poles 5½ feet long with two 9″ notches whose inner edges are 3 feet apart. These cross pieces are laid 3 feet apart like the rungs of a ladder. Over the notches of the cross pieces are fixed longitudinal beams 20 feet long and 9" in diameter which serve the double purpose of preventing the timber travelling on the road from rolling side ways and also prevent lateral play in the cross pieces; struts are also introduced between the cross pieces to keep them the same distance apart. The cross pieces are carefully laid so that their upper surface forms a smooth gradient because otherwise, a log travelling downwards may hit its nose against any piece raised above the others and thus tear it from its seating. The stability and life of this road depends to a great extent on the drainage provided. For this purpose small chips of stone and gravel are spread between the cross pieces and so preventing erosion. On one side of the road there is a clear way of 8 feet in order to allow a tractor to pull down the logs, although at the moment this work is being performed by coolies. The cross pieces are smeared with oil—the waste oil from the tractors, and the logs move slowly down with surprising ease; in fact, over one portion they move by gravity alone: Later, it is anticipated that tractors will pull down whole strings of logs.

From Naikenparai some of the logs are taken down the Ghat road by carts, and some are dragged down the old slide which emerges on the road at the foot of the hill. The latter is of course quicker, but this one road, the site of which appears to have been badly chosen for present work, and which is in poor repair, cannot handle the large volume of timber now being extracted. The logs shoot down two portions of the old dry slide quite well, but much time is lost in the middle when they stick for some little time.

B. H. Ananda Raw

M. F. C. Student, 1922—24- Dn.

EXTRACTS.

Does Paint Preserve Wood?

A Conflict Between Theory and Practice, and How It Is Explained Away By H. D. Tiemann Dry Kiln Expert, U. S. Forest, Products Laboratory, Madison, Wis.

Does painting actually preserve wood? And if so, how? The question is not so simple as it seems. Ask the timber pathologist, and the answer is that there is nothing in ordinary paint which is poisonous to fungi and therefore it does not prevent decay by any antiseptic action. So far as known, decay occurs and can only occur through the action of fungi. He will say, furthermore, that paint may even induce rapid decay by keeping the wood damp on the inside, retarding its rapid drying when placed in a situation where it frequently is subject to wetting—in other words, introducing a factor of lag in the wet-dry cycle.

The wood technologist, moreover, will tell you that paint does not prevent the absorption of moisture from the air. While undoubtedly a retardant, it does not act as a moisture-proof seal; and nothing but hermetically sealing up the wood will prevent its ultimately absorbing moisture if exposed to a damp condition long enough. Some forms of varnish are better in this respect, shellac is good, and paraffin is better still. Three coats of spar varnish may postpone the final action for a month or two, but linseed oil paint even in heavy coatings, will only delay the evil a few weeks. Consequently the "working" of wood—its shrinkage and swelling with exposure to dry and to damp air for considerable lengths of time—cannot be prevented by painting or varnishing. This phenomenon is only too familiar to every householder as well as woodworker through the shrinkage and swelling of floors, doors, picture frames, and furniture. In heated rooms in winter the moisture content will drop to four or five per cent of the dry weight, and in summer, with outdoor conditions in the house, it will rise to 12 or 14 per cent or may even reach 18 or 20, with attendant sticking of drawers and rubbing of doors.

Now suppose you go to the builder or the practical man in general and ask him about this matter of paint. His verdict, based on years of experience, will of course be that painting is highly beneficial in protecting the wood.

Are the technical men wrong? Or can we somehow reconcile these apparertly conflicting ideas?

The answer lies in the behavior of wood to the influence of moisture, a manner of behavior which is not generally understood. All the statements made are true, and it is interesting to follow out the way in which paint actually does prevent or retard the destruction of wood. We need not appreciate paint less for knowing wood better.

Some of the phenomena which take place when wood dries will need explanation. Perhaps the most important of these is the peculiar propensity of wood to become "set" or fixed in the position and dimensions in which it is held while it dries. While wet, and particularly when warm, it is somewhat plastic and may be distorted to a certain extent by applied forces. If the forces applied continuously during the drying, the wood will harden and retain the distortion even after the forces are removed.

This statement applies not only to the piece as a whole, but also and more especially to the internal structure. Suppose a piece of wood which has been thoroughly moistened is prevented by framing or bracing from shrinking until it is dry; it will become "set" in its expanded condition, and will remain enlarged after the bracing has been removed. The internal stresses set up at the start seem to have disappeared entirely. But they have only become latent, as it were; and if the wood is remoistened they will again reappear in full force and effect. For example, if a piece of bent-wood be remoistened it will tend to straighten out, particularly if heated. The hardening process is thus quite a different thing from the hardening of cement, where the stresses do not thus become latent, and it should not be thought of in the same way.

The actual internal mechanism of wood behaviour under moisture changes is unknown; but in order to picture what will occur in wood under given circumstances the following analogy may help.

Immagine a honeycomb in which the cell walls are composed of a substance which is plastic and somewhat elastic, like rubber, when wet, but loses these properties when dry, hardening in whatever shape it is held while drying. Furthermore, suppose that the substance itself swells and shrinks with moisture changes. Suppose we take a wet block of this honeycomb and compress it by an external applied force. The result will be that the cells will become distorted; instead of being hexagonal they will become more elliptical in outline. Now let the substance be dried while being held in this distorted condition. The walls will at first stiffen up and lose their elasticity so that there is no longer any tendency for the cells to resume their hexagonal form, the stresses thus disappearing or becoming latent. This is an explanation, or a fairly good picture at least, of the "setting" of wood in a distorted shape or size when it dries.

At this stage a further important effect of drying will occur; the same process will be noted when we come to the actual phenomena of wood. The wall-substance itself, according to our hypothesis, will begin to shrink, and the result will be that the block as a whole will finally reach a ***smaller*** size than it would have done had no compression been applied to start with. (A similar result of the opposite kind may be produced by stretching the block originally.)

Now, to come closer to the main point, let us suppose that we start with a dry block of this honeycomb and clamp it in such a way that it is impossible for it to swell (just like honeycomb in its square wooden frame), but that we exert no external compressive force upon it other than the resistance to its own swelling. Now let it be moistened, and what will happen? The cell walls will swell, but as the block as a whole cannot expand, the walls of the cells will crumple, distorting the form of the cavities. If now the substances be dried it will harden in the new crumpled shape, the stresses becoming latent exactly as in the other case. The cell wall substance will then shrink as before and the whole block will pull away from the box, and it will now occupy a smaller space than it did originally before it was moistened. Upon remoistening in a free condition the crumpled walls will resume their elasticity and tend to return to their original shapes.

Coming now to the actual drying of a piece of wood, the sequence is this:

The outer surface, drying first,tends to shrink but is prevented from doing so by the moist interior. Stress is set up, the outside in tension, the inside in compression. The outside then becomes set ("casehardened") in its expanded condition, as explained in the analogy. As soon as the free water has all evaporated from the cavities of the interior cells ("fibre saturation point" passed). the inside of the block tends to shrink but is in turn hindered from doing so by the expanded set exterior. The stresses are therefore reversed, the inside now being in tension. As drying proceeds still further the inside becomes "set" in an expanded condition which, owing to a slight yielding of the exterior, will be of a less degree than the set of the latter, or else the tension will become so great that the fibres will actually pull apart, causing what is commonly designated as "honeycombing" or "hollow horning."

These stresses are easily proved by cutting a cross-section from a dried block and slicing it into prongs like a fork. The unbalanced stresses cause the prongs to curve, the tension side being concave, and the compression convex.

By an indirect method the set condition is also easy to show. If the section be sliced into prongs when only half dry and then allowed to dry slowly in the air, the outer prongs will shrink much less than the inner ones, owing to their already set condition. The internal stress which would have existed had drying been completed before the slices were made is approximately measured by the force which would be required to bring all the prongs to the same length. This is evidently considerable. Can you wonder at a piece of lumber for cracking open or warping under such stresses? Yet this condition is not the exception, but the general rule. In fact, it is practically impossible to dry a piece of wood without such stresses occuring to a greater or less degree. If there is doubt about this in the mind of anyone, let him make the test himself. It is very easy. The section should be cut while the board is still damp inside, as explained above.

We are now able to predict what is likely to happen to a piece of wood exposed to the weather. If a dry piece of wood is held or clamped in such a way that it cannot swell and it is then moistened, a strong compression stress will be set up by the wood itself in itself, which will act in the same manner as an applied external force. If the wood is redried under this restriction it will become "set in compression" to such an extent that when it finally reaches its original state of dryness it will be *smaller than it was before*. By repeating this process a piece of wood may be made smaller and smaller. By the method of repeated wetting under restriction and then redrying, a strip of air-dry basswood 9-15/16 inches long tangentially to the rings was compressed to a length of 7-7/16 inches.

From a one-inch oak board the smaller end section was first cut off and the larger piece cut in two. One-half of the larger piece was then clamped in an iron frame so that it could not expand tangentially, was steamed about a day, and was subsequently allowed to dry again. It soon became loose from the clamps and finally shrank. The other half, received precisely the same treatment except that it was not held in the clamp while being steamed and was free to swell as much as it pleased; the ends of the piece which was not clamped are very much checked. This is not an accident, but is due to the same cause. Since the wood takes on moisture much more rapidly at the ends than in the middle, the ends tend to swell; they are prevented from so doing, however, by the middle portion of the block. The ends are therefore thrown into strong compressive stress, just as the clamped block was, and when the block is dried they will, in the characteristic manner, shrink more than the rest of the block, thus opening up in wide end-checks.

This is not merely an interesting laboratory experiment of purely "scientific interest": not by any means. It is one of the most fundamental facts concerning the behaviour of wood and applies all the way from the lumberman's shanty to the finest piece of furniture in the lumber king's palace; but it is not commonly understood.

The reverse of this action may also be brought about, as in the casehardening of the outer surface of wood

But what has all this to do with paint? Let us see. A cross section was taken of well dried piece of red oak which showed no checks. The central area was then wet several times with hot water care being taken not to wet the surrounding portion. Upon redrying, cracks appeared. Now the cracks were not produced by wetting and drying alone, but *by the compression stress caused by the restriction to swelling, the subsequent setting of the substance under compression, and further shrinkage as it redried.* Repeated wetting and drying causes an accentuation of this condition. It is this identical process which causes exposed surfaces of wood everywhere to crack open and become weathered. One frequently observes its results in hardwood window and door sills, flooring and steps, which are subjected to repeated wetting and drying. As dirt enters the cracks the compression is thereby increased each time the surface swells; when it dries, the openings become wider and the cracks strike in deeper and deeper. It will be observed that at first it is only a *surface effect* and is due to the prevention of the swelling of the surface by the deeper portion of the wood which has not yet become wet. It is the abrupt changes in moisture content between the surface and the inner layers of the wood, or between any adjacent portions which are responsible for the conditions of surface checking and subsequent deterioration.

Paint is not proof against gradual absorption of moisture and therefore will not prevent swelling or shrinkage from taking place if given sufficient time; what it does do is to *retard the rate of absorption or loss of moisture through the surface*, thus giving time for a partial equalization of the moisture and reduction of the moisture gradient within the piece. Paint does not make wood poisonous to wood-destroying fungi, but by preventing the surface cracks it makes it harder for the fungi to get a foothold and so helps to preserve the wood.

The equalization of the moisture distribution throughout the piece brought about by the coating of paint, when applied to all surfaces also prevents excessive warping of the piece as a whole.—*Extract from "The Scientific American" for May 1924.*

* * * * * *

Forests and Rainfall.

The question of the influence of woodland upon rainfall is a very old one, yet it cannot be said even now to be fully answered. While there is indisputable evidence from all parts of the globe that the reckless destruction of forest growth has brought progressive desiccation in its train, it has only comparatively recently come to be realised that the problem is essentially hydrological rather than meteorological. When indeed one reflects that a forest is itself primarily an adaptation to rainfall and other climatic conditions, it is somewhat surprising that the earlier investigators should have expected to find anything more than a secondary reaction of the forest upon rainfall. No doubt the characteristic type of forest prevailing in moist regions like Europe helps by maintaining the humidity of the atmosphere to equalise, if not slightly to increase, the rainfall over the year as compared with denuded tracts; but, on the other hand recent research by Quayle in Australia has shown that where forest and scrub are composed of droughtresisting species, reducing transpiration to a minimum, a distinct increase of rainfall has followed deforestation in the interests of settlement, and the replacement of xerophilous vegetation by grass and crops.

It is however, as a hydrological agent that forest plays an immensely important part in conserving moisture in the soil, regulating its discharge into rivers, and in general modifying the natural drainage of a country—though the precise effect must vary with the nature of the country, and the climate. It is satisfactory to find that this deeper understanding of what is in reality a very complex problem in physical geography is leading to investigations abroad, as in Italy, where according to Prof. Filippo Eredia, the various hydrological services are studying the relation between rainfall and woodlands in all its aspects.

One very important fact bearing upon this subject remains to be pointed out. It was shown by that eminent climatologist, Julius Von Hann, that there is a way in which forests *do* very decidedly increase "rainfall" in the broader sense of the term, namely, by collecting the moisture of fog. This is especially true of hill-fog and mountain-mist. Upland fog is, by its different mode of origin, normally wetter than lowland fog, and on drifting across wooded mountain slopes deposits large quantities of moisture. Even in the drier lowland fogs produced by radiation on cold nights, it is a familiar fact of observation that there is a constant dripping of water beneath trees, which when the temperature is below freezing point, become heavily decked with rime, often collecting on the ground like a light snowfall.

In this connection, the experiments of Dr. Marloth on Table Mountain in the opening years of this century, and published in the *South African Journal of Science* and elsewhere, deserve to be more widely known. He showed that the vegetation of the mountain, as well as rain-gauges fitted with wire-netting collected large quantities of water from the hill-mists produced in the moisture-laden S. E. Trade. —L. C. W. B.—*Extracted from "Nature" April 5, 1924.*

* * * * * *

Meteorological Factors, and Forest Fires in the United States:

Forest fires have long been a source of damage and loss in North America, and for many years the U. S. Department of Agriculture, by the aid of the Forest Service and the Weather Bureau, has sought, so far as possible, to mitigate the amount of havoc by fire control. Necessarily immense difficulties harass the work in many ways, but without doubt the unceasing care and activity of those engaged in telling in its results. A prime feature in the discussion is the forecasting of fireweather with the object of avoiding the fires or competing with them when necessary The U. S *Monthly Weather Review* for the past two years contains many varied articles on the subject, written from different points of view. Only the merest reference can be made to them here. Occasional articles have appeared for at least ten or twelve years connecting the forest fires with lightning, but it is only in the last two years—1922 and 1923—that the communications have become so frequent and widespread. In 1923 there were at least twelve communications, seven of which occur in the November number. It is almost invidious to single out those by special authors.

In the *Monthly Weather Review* for March 1921 Mr. E. N. Munns of the Californian Forest Service, endeavours to correlate evaporation and forest fires, associating evaporation with temperature, humidity and wind. During eleven years nearly 5,000,000 acres of land were burned over in this district, with a damage to standing timber estimated at 28 million dollars, and an outlay in fire prevention and suppression for about four and a half million dollars. Diagrams are given showing for seven sections of the district the average area per fire for each of the eleven years and the mean for the whole period. The years 1910 and 1919 stand out as experiencing the most disastrous fires. The outstanding causes of forest fires appear to be lightning, railroads, campers, and slash burning, of which lightning is the cause of the greatest number; some sections are said to have few fires from any cause except lightning. Sunshine, wind movement, and moisture deficit are much above the average in years of bad forest fires, and there are other meteorological elements which afford very critical weather for forest fires. There is a general belief that forecast of fine weather conditions would be invaluable if they could be made sufficiently accurate and localised to be trustworthy.

"The occurence of Lightning storms in relation to Forest fires in California is dealt with in the *Monthly Weather Review* for April 1923. It is asserted that lightning has been proved to be the principal single cause of forest fires in California, and throughout the West. In the national forest of California during the years 1911-20 lightning has been responsible for 4363 out of a total of 10,527 fires, or 41.5%. Further study of the storms involving lightning is strongly advocated; 89 per cent of the lightning fires occur in June, July and August. If the Forester knows the different degrees of inflammability of the fuel in terms of differences in its moisture content, it is possible for him to state definitely for tomorrow or the next day what influence the approaching weather will have in making it wetter or drier.

The cause of thunderstorms is now better understood, and with our increased knowledge of the upper air, the knowledge of thunderstorms will be still further advanced, and better warnings will be disseminated.—*Extract from Nature for May 3, 1924*

Contributions to the Museum.

Serial No.	Contribution.	Contributor.
1.	Cocoon of Tassar Silk Worm found on Venteak seedling.	J. M. Sweet Esq., I. F. S.
2.	Fruits of Eugenia Gardneri.	J. A. Master Esq., I. F. S.
3.	Three mounted bear skins One mounted panther skin One mounted Sambhur head.	(Lent by) E. L. Skinner Esq., (Indian Police Service)
4.	One python	M. R. Ry. T. D. Ponniah Range officer Dharmapuri.

Additions to the Madras Forest College Library.

1. Ceylon Administration report for 1922.
2. *Presented by, Md. Abdul Karim Sahib Bahadur. D. F. O. North Vellore:—*
   - (a) Schlich's Manual of Forestry— Vols., I to V.
   - (b) 'The Indian Forester'. Vol. XXVIII (1902)
     - " XXIX (1903)
     - " XXX (1904)
3. *Presented by H. C. Bennett Esq., I. F. S.:—*
   - (a) "Practical hints on flower gardening in Madras"—By, F. H. D.
   - (b) Lessons on Elementary Botany, By, Daniel Oliver, L. L. D.
   - (c) First book of Indian Botany, By D. Oliver.
   - (d) "Madras Timbers"—By, A. W. Lushington C. I. E.
   - (e) Fauna of British India.—Birds. Vol. I —By, E. C. Stuart Baker 1922.
   - (f) Fauna of British India—Oligochaeta. —By, J. Stephenson 1923.
   - (g) Fauna of British India—Diptera. Vol. III —By, E Brunetti; 1923.
   - (h) "The Indian Botanical Society—History, aims, and objects etc of the society"
   - (i) Proceedings of the Second annual meeting of the Indian Botanical Society held at Lucknow in Jan. 1923.
4. Practical Botany—By, K. Rangachari.
5. 'The journal of Indian Botany' Vol. III No. 5
6. The journal of Indian Botanical Society. Vol. III No. 8.
7. Proceedings of the 9th. Indian Science Congress.
8. "Note on a visit to the Nilambur Teak Plantations in Madras Presidency"—By, A. Rodger (March 10th to 12th 1920).
9. Progress report on Forest Administration in the Punjab for the year 1922-23.
10. Bulletin No 86. List of the Important insects injurious to Cultivated Crops in South India,—By, T. V. Ramakrishna Ayyar. B. A. F. Z. S., Assistant Entomologist, Madras.
11. Madras Agricultural department, Year Book 1923.
12. Working plan for the Dehra Dun Forest Division, 1923-24 to 1932-33.

13. Working Plan for the South Kheri Forests, V. P. 1923-24 to 1932-33.
14. Annual report on the Forest Administration in Ajmer-Merwara for 1922-23.
15. Ninth Indian Science Congress—Presidential address (Section of Botany)—By, Dr. W. Dudgeon.
16. Report on the operations of the Department of Agriculture, Madras Presidency, for 1922-23.
17. Report of the Madras Retrenchment Committee 1922-23, Vols. I and II.
18. Indian Forest Records Vol. X part VII. Results of the mechanical and physical tests on certain of the commoner Indian timbers—By, L. N. Seaman M. A.
19. Report on Public Instruction in the Madras Presidency for 1922 23. Vols, I and II.
20. Notes on the tannin resources of Western Australia—By, S. L. Kessell.
21. Annual report on Working Plans and Sylvirculture in Burma for 1922-23
22. Progress of Education in India 1917-22,—By, J. A. Richey C. I. E. Eighth quinquennial review. Vols. I and II.
23. Forest Research in India 1922-23. Progress Report of Forest-Research Work in India.
24. Bulletin of the Imperial Institute Vol. XXI No. 3, 1923.
25 "The Hard woods of Western Australia"
26. Annual report on Working Plans and Silviculture in Burma for 1922-23.
27. Indian Forest Records, Vol. X part II. Oils and fats from the seeds of Indian plants.
28. Classified list of Forest officers in the Madras Presidency corected up to 1-4-1924.
29. Administration report of the Forest Department of the Madras Presidency for the year ending 31st March 1923. (1922-23)
30. India and the Imperial Conference of 1923.—Compiled by the Director of Public information, Government of India.

Gazette Notifications.

5—2—1924.

Saiyid-ud-din Ahmad Sahib Bahr., D F. O., Krishna, leave on average pay for six months with effect from date of relief.

Mr. H. C. Bennett, Conservator of Forests, leave on average pay for eight months, and leave on half average pay for one year, three months and fourteen days with effect from or after 16th March 1924. The Government, with the sanction of the Secretary of State for India, are pleased to permit Mr. H. C. Bennett, Conservator of Forests, to retire from the Indian Forest Service, with effect from the date expiry of the leave granted to him.

M. R. Ry. P. Govinda Menon, E. A. C., of Forests, is granted leave on average pay for ten days from 12th December 1923 with permission to affix the Christmas holidays to the leave.

12—2—1924.

M. R. Ry. A Raju Naicker avergal, D. F. O., Central Salem, leave on average pay for one month from 3rd. January 1924.

M. R. Ry. E. B. Ramachandra Rao avergal D. F. O., North Salem, to be in full charge of the Central Salem division in addition to his own duties, *vice* M. R. Ry. A. Raju Nayakar avergal granted leave.

Mr. D. T. Barry, Acting Conservator of forests, II circle, to act as Conservator of Forests, I Circle, *vice* Mr. H. C. Bennett, granted leave.

Mr. Clear, D. F. O., North Coimbatore, to act as Conservator of Forests II Circle *vice* Mr. D. T. Barry.

Mr. R. S. Browne, Assistant Conservator of Forests South Coimbatore, to be D. F. O., North Coimbatore, *vice* Mr. T. Clear.

M. R. Ry. Rao Sahib K. R. Venkataramana Ayyar avergal, deputy Conservator of Forests, on return from leave, to be D. F. O., Upper Godaveri,

Saiyid Riaz-ud-din Sahib Bahadur, E. A. C. of Forests, Guntur, to be D. F. O. Kistna, *vice* Saiyid-ud-din Ahmed Sahib Bahadur, granted leave.

The Government, with the sanction of the Secretary of State for India are pleased to permit Mr. R. Bourne, Deputy Conservator of Forests, to retire from the Indian Forest Service with effect from 20th January 1924.

M. R. Ry. B. S. Kesava Vittal, E. A. C. of Forests, South Mangalore, granted leave on average pay on medical certificate for four months with effect from 2nd February 1924.

19—2—1924.

Mr. D. R. Currie, Deputy Conservator of Forests, to be special working Plan Officer Manantoddy.

Mr. Roland Mitchell, D. F. O. Upper Godaveri, on relief by M.R.Ry. Rao Sahib K. R. Venkataramana Iyer Avergal, to be D. F. O. Bellary *vice* Mr. D. A. Stracey granted leave.

26—2—1924.

Mr. D. A. Stracey, D. F. O. Bellary, leave on average pay for 4 months with effect from or after 1st March 1924.

M. R. Ry. E. B. Ramachandra Rao Avergal D. F. O. North Salem, leave on average pay for 4 months with effect from date of relief.

M. R. Ry. A. Raju Naicker Avergal D. F. O. on leave, an extension of leave on average pay for 10 days.

Mr. W. C. Hart, E. A. C. of Forests, on return from leave, to be D. F. O. North Salem vice M. R. Ry. E. B. Ramachandra Rao Avergal granted leave.

Mr. H. E. Brown, Probationary E. A. C. of Forests, South Coimbotore Division, is granted leave on average pay for 6 weeks from the date of relief.

M. R. Ry. A. Hanumantha Rao Avergal will continne to be in charge of the division during the period of absence on leave of M. R. Ry. S. V. Devadason.

M. R. Ry. S. V. Devadason Avergal, E. A. C. of Forests is granted Extension of leave on average pay for 6 weeks in continuatien of the leave already granted to him.

M. R. Ry. K. G. Belliappa Avergal, E. A. C. of Forests is granted extension of leave on average pay for 2 months and 3 days in continuation of the leave for two months already granted to him.

4—3—1924.

Mr. D. F. Stileman, Deputy Conservator of Forests, leave on average pay for seven months and 14 days and half average pay for 16 days with effect from 3rd February '24

M. R. Ry. T. V. Venkateswara Ayyar, E. A C. of Forests, will, on the expiry of his leave be attached to the South Mangalore division.

11—3—1924.

Mr. S. R. Rao, Assistant Conservator of Forests is posted to Guntur for training under the District Forest Officer.

18—3—1924.

Mr. H. P. Ward, Assistant Conservator of Forests, is posted for duty under the Forest Utilization Officer, Madras.

Mr. B. A. Cariappa, Probationary E. A. C. of Forests, is posted for the work of verification and demarcation of forest boundaries in the Nilgiris.

25—3—1924.

Mr. J. D. Connolly, D. F. O., Palghat, leave on average pay for seven days from 3rd to 9th January 1924.

M. R. Ry. M. S. Rangasami, Probationary E. A. C., of Forests, Palghat, is granted leave on average pay on medical certificate for six weeks from 17th January 1924.

M. R. Ry. M. Srinivasaraghavan avergal, E. A. C., of Forests, West Kurnool Dist., is granted leave on average pay for one month and eight days, and leave on half average pay for twenty two days with effect from date of relief.

1—4—1924.

M. R. Ry. E V. Padmanaba Pillai avergal, D. F. O., Kurnool South, is granted leave on average pay for one month from 23rd April 1924.

M. R. Ry. S. Ramasamier avergal, E. A. C. of Forests to be in-charge of the division during the absence of M. R. Ry. S. V. Padmanaba Pillai avergal on leave.

M. R. Ry. A Hanumantha Rao avergal E. A. C. of Forests, on relief by M. R. Ry. S. V. Devadasan, will be attached to the North Vellore Dist. until further orders.

8—4—1924

Muhammad Abdul Hafiz Sahib Bahadur, D. F. O. South Salem leave on average pay for two months from 23rd April 1924.

M. R. Ry. A. Hanumantha Rao avergal, E. A. C. of Forests, to be D. F. O North Vellore, *vice* Muhammad Abdul Karim Sahib Bahadur.

Muhammad Abdul Karim Sahib Bahadur, D. F. O. North Vellore, to be D. F. O. South Salem, *vice* Muhammad Abdul Hafiz Sahib Bahadur, granted leave.

Mr. D. M. Currie, Working Plans Officer, Manantoddy, to be D. F. O. Nilgiris, *vice* Mr. F. D. Ardagh granted leave.

Mr. N. D. M. Sahni. Assistant Conservator of Forests, Forest Exploitation Division, is posted to the South Coimbatore Division for work under the District Forest Officer.

M. R. Ry. A. R. Narasimha Ayyangar avergal, E. A. C, of Forests, on special duty in the Chief Conservator's Office, is posted to the Nilgiris District for work under the District Forest Officer.

15—4—1924.

Mr. F. D. Ardagh, D. F. O., the Nilgiris, leave on average pay for one month with effect from the date of relief.

22—4—1924.

M. R. Ry. S. Amirtaswami Pillai avergal, Deputy Collector, and Personal Assistant to the Chief Conservator of Forests, leave on average pay for three months with effect from 1st May 1924 or later date of relief.

Mr. A. M. C. Littlewood, D. F. O., Guntur, is granted leave on average pay for six weeks from 29th April 1924.

Mr. C. J. Van Haeften, E. A. C., of Forests Guntur, is posted to be in charge of the division during the period of absence of Mr. A. M. C. Littlewood on leave.

6—5—1924.

Mr. S. R. Rao who has been appointed by His Majesty's Secretary of State for India to the Indian Forest Service, is appointed Assistant Conservator of Forests, in the Madras Presidency, with effect from 14th February 1924.

Mr. Harish Chandra Khanna, Assistant Conservator of Forests, Madras Presidency, is transforred to the Punjab with effect from the afternoon of the 20th March 1924.

M. R. Ry. P. Govinda Menon, E. A. C., of Forests, is granted privilege leave for eleven days from 12th December 1923 with permission to affix the Christmas holidays to the leave.

M. R. Ry. B. A. Cariappa, Probationary E. A. C., of Forests, to the Forest Exploitation Division, Olavakode. He should report himself to the Logging Engineer for duty.

Mr. H. E. Brown, Probationary E. A C. of Forests, on the expiry of his leave, to the Nilgiris for the verification of Forest boundaries.

20—5—1924.

M. R. Ry., E. K. Krishnan avergal, E. A. C. of Forests, an extension of leave on average pay on medical certificate for eight days from 6th april 1924 and leave on half average pay for one month and twenty two days in continuation thereof.

M. R. Ry., Kinnatinkara Kizhakepat Raman Nair avergal, acting Deputy Collector, is appointed Personal Assistant to the Chief Conservator of Forests on probation for six months from the date of joining the appointment, *vice* M. R. Ry., S. Amirthasami Pillai Avl.

M. Amir Badsha Sahib Bahadur, E. A. C. of Forests attached to the South Mangalore Division, leave on average pay for three months with effect from date of relief.

Notifications relating to Rangers.

First Circle.

6—2—1924.

1. On expiry of his suspension period Mr. S. A. Dawson, Ranger V grade, is posted to Parlakimidi Maliahs for the charge of the Mahendra Range.
2. M. R. Ry. A. Rama Hebbar, Ranger III grade, Parlakimidi Maliahs, is granted leave on average pay for two months with effect from date of relief by No. 1.

8—2—1924.

1. The leave on average salary for 1½ months from 3—1—1924 granted to M. R. Ry. P. Duraiswami Ayyar, Ranger III grade is extended by 2 months.

2. The arrangements ordered in the above service order will continue.

13—2—1924.

M. R. Ry. B. Bhagirathi, Ranger VII grade Ganjam is granted leave on average salary for four months with effect from or after 1st July 1924.

22—2—1924.

Mr. D. E. Lewin Ranger V grade, Ganjam, is granted leave on average pay for 4 months with effect from 1-3-1924 or date of relief and leave on half average pay for 8 months in continuation thereof.

3—3—1924.

M. R. Ry. A. Surya Rao Supernumerary Ranger Godavari Upper is granted leave on average salary for two months with effect from the date of relief.

12—4—1924.

M. R. Ry. A. Tirupatirayudu, Supernumerary Ranger, Lower Godavari is granted leave on average salary for one month with effect from or after 16th April 1924.

23—4—1924.

Under rule 81 of the Fundamental Rules M. R. Ry. G. T. Tiruvengadam, Ranger V Grade, Godavari Upper, is granted leave on average pay for four months with effect from date of relief by Manager Theodore.

24—4—1924.

Mr. J. D. Theodore, Ranger VI grade, Ganjam is transferred to Upper Godavari to charge of Marrigudem Range to join immediately on relief in Ganjam.

1. M. R. Ry. A. Rama Hebbar, Ranger III grade, Parlakimidi Maliahs on return from leave is posted to the Palakonda Range Vizagapatam District.
2. On relief by No. 1 M. R. Ry. A. R. Pingale, Ranger VI grade Vizagapatam District is transferred to the Godavari Upper Division.

30—4—1924.

1. This office S. O. No. 21/24 dated 24-4-1924 so far as the transfer of M. R. Ry. A. Rama Hebbar, Ranger III grade to Palakonda in concerned is cancelled.

2. Mr. C. S. King, Ranger III grade on his relief in Kistna district when the present Bezwada Range reserves are transferred to the Guntur District is transferred to Vizagapatam to charge of the Palakonda Range.

1—5—1924.

In Supercession of this office S. O. No. 20/24 dated 24—4—1924 M. R. Ry., I. Sambasiva Rao Naidu, Ranger VI Grade, Ganjam, is transferred to Upper Godavari for the charge of the Marrigudam Range.

8—5—1924.

1. Mr. W. S. Pernandez Ranger IV grade, Upper Godavari division is granted leave on average salary for 2 months with effect from date of relief.

2. M. R. Ry., B. V. Nagaraja Ayyar, Range officer, Pulusumamidi Range, will hold additional charge of Lakkavaram Range, during the absence of No. 1 on leave.

9—5—1924.

The leave on average salary for 2 months granted in this office S. O. No. 17 of 1924 to A. Surya Rao Naidu, Supernumerary Ranger, Upper Godavari, is extended by one month.

18—5—1924.

The leave on average salary for one month granted under Rule 81 of the Fundamental Rules to A. Tirupatirayudu, Supernumerary Ranger, Lower Godavari in this office S. O. No. 18 dated 12th April 1924 is extended by one month and sixteen days.

Second Circle.

17—2—1924.

Ranger R Jagannatham Naidu, VII Grade, Gundlakamma Range, Kurnool South Division is granted leave on average pay for one month from date of relief.

2. Supernumerary Ranger P. Gopalan attached to Kurnool South Division is posted as a temporary measure to the Gundlakamma Range *vice* No. 1 on leave or until further orders.

8—3—1924.

M. R. Ry., S. Chinnadurai Pillai, Ranger II Grade is granted an extension of leave on half average pay on medical certificate for 3 months in continuation of the leave granted for 3 months.

Ranger A. Rahimankhan VI Grade on return from leave (11-3-1924) is posted to the charge of Gundlakama Range of Kurnool South Division to relieve Supernumerary Ranger P. Gopalan, posted in this office S. O. 8/24 dated 17-2-24.

The latter after relief will continue on special duty in the same division.

24—3—1924.

M. R. Ry., T. K. Ramaswamy Iyer Ranger II Grade of Markapur Range, Kurnool East Division is granted leave on average pay for a month from or after 7-4-1924.

2. M. R. Ry., T. M. Krishnamachari, Supernumerary Ranger Bellary District is posted to Markapur Range to relieve No. 1 on 7th April 1924 fore noon.

29—3—1924.

Mr. J. B. Rodrigues, Supernumerary Ranger is granted an extension of leave on half average pay for one week from 13-1-24 to 19-1-24 inclusive.

31—3—1924.

M. R. Ry. P. Dhananjaya Rao Range IV Grade, Bapatla Range, Guntur District is granted leave on average pay for one month from 15-4-1924 or from date of relief.

2. M. R. Ry. M. Umapathy Mudaliar, Range Officer, Sathenapalle, to hold additional charge of Bapatla Range *vice* No. 1 on leave or until further orders.

On the expiry of his Medical leave, Supernumerary Ranger, Mr. B. Krishna Rao is posted to Bellary District subject to the production of Certificate of physical fitness to re-join duty.

7—4—1924.

Mr. A. Rahimkhan Ranger VI Grade is granted an extension of leave on average pay for one month from 11-3-1924.

11—4—1924.

1. Mr. A. Rahim Khan Ranger VI Grade on return from leave is posted to Vinukonda Range, Guntur District.

Note :—This cancels this office S. O. No. 13/24 dated 8-3-1924 posting him to Gundlakamma Range of Kurnool South Division.

2. Mr. J. B. Rodrigues Supernumerary Ranger, in charge of Vinukonda Range, on relief by No 1 to be on special duty the same District.

11—4—1924.

1. M. R. Ry. R. Jagannadham Naidu Ranger VII Grade on return from leave is posted to Tadpatri Range, Anantapur District.
2. M. R. Ry. K. Purushothama Rao, Range Officer, Tadpatri Range on relief by No. 1 is transferred to Kurnool South division and posted to charge of Gundlakamma Range.
3. M. R. Ry. P. Gopalan Supernumerary Ranger in charge of Gundlakamma Range on relief by No 2 to be on special duty in the same District until further orders.

18—4—1924.

Ranger A. Rahim Khan is granted an extension of leave on full average pay for one month fron 11-4-1924.

20—4—1924.

1. M. R. Ry., N. Sundaresa Aiyer Range Officer, Bellary is granted leave on full average pay for one month from 26-3-24.
2. M. R. Ry. B. Krishna Rao, Supernumerary Ranger is posted to be in charge of Bellary Range *vice* No. 1.

Extract from Item No. 1, 2 and 3 of the Chief Conservator's Proceedings Mis. No. 133/24 dated 13-4-24.

The following promotions and reversions of rangers are ordered with effect from 1st March 1924.

I. In the vacancy caused by the reduction of M. R. Ry., S. Chidambara Iyer, Ranger, IV Grade to V Grade.

To IV Grade permanent:- Mir abdul Hussain Kirmani Sahib Ranger, V. Grade permanent and IV Grade *sub protem.*

* * * *

II. In the vacancy caused by the retirement of M. R. Ry. C. Rajagopala Nayudu, Ranger, I Grade.

Permanent.

To I Grade. M. R. Ry., C. Ramaswami Nayudu, Ranger II Grade, permanent.

* * * *

Sub-protem.

III. *To II Grade.* M. R. Ry., M. Subbarayulu Nayudu, Ranger III Grade.

* * * *

22—4—1924.

Ranger R. Jaganadham Naidu on return from leave is posted to Giddalore Range.

2. Ranger M. Subrayalu Naidu on relief by No. 1 is transferred to Tadpatri Range, Anantapur District.

26—4—1924.

M. R. Ry. T. K. Ramaswami Iyer Ranger II Grade on return from leave is reposted to Kurnool East Division.

The leave granted to Ranger P. Dhananjaya Rao for one month in this office S. O. No. 18/24 dated 31—3—1924 is hereby cancelled.

20—5—1924.

M. R. Ry., N. Sundaresa Iyer, Range Officer, Bellary is granted an extension of leave on average salary on Medical Certificate for three months from 27—4—1924, in continuation of one month's leave already granted to him by the District Forest Officer, Bellary.

2. The existing arrangements will continue.

27—5—1924.

M. R. Ry. S. Chinnadurai Pillai Ranger II Grade is granted an extension of leave on half average pay on Medical Certificate for one month in continuation of the leave granted to him.

29—5—1924.

M. R. Ry. T. K. Ramaswamy Iyer, Ranger, II Grade is granted an extension of leave on average pay on Medical Certificate for two months in continuation of one month's leave granted to him.

2. The existing arrangements will continue.

Third Circle.

13—2—1924.

M. R. Ry. P. K. Kuttappan Pillai, Supernumerary Ranger, North Vellore District is transferred to South Cuddaph District on special duty to conduct the thinning of Red Sanders Coppice shoots in worked coupes.

14—2—1924.

M. R. Ry. B. V. Vaideeswara Ayyar Ranger V grade on the abolition of the Kondapuram Range, West Cuddapah District is posted to the South Cuddapah District on special duty to conduct thinning of Red Sanders Coppice Shoots in worked coupes.

17—2—24.

M. R. Ry. S. Chidambara Ayyar, Ranger V Grade on return from leave granted in this office Service order No. 5/24 dated 17th January 1924 is posted to South Cuddapah District on special duty for conducting thinning operations of Red Sanders Copice shoots.

26—2—1924.

M. R. Ry. B. V. Vaideeswara Ayyar Ranger V grade on the abolition of the Kondapuram Range, West Cuddapah District is posted to the charge of Kanigiri Range, Nellore District.

2. M. R. Ry. A. Siddan Pillai Ranger IV grade in charge of Kanigiri Range Nellore District on relief by No. 1 is granted leave on averaga pay for two months with effect from date of relief.

Para (i) above cancels the posting of Ranger M. R. Ry. B. V. Vaideeswara Ayyar to special duty, South Cuddapah District.

29—2—1924.

M. R. Ry. S. Chidambara Ayyar, Ranger V grade is granted extension of leave on average pay for 3 months on Medical Certificate from 16th February 1924 in continuation of the leave granted to him in this office service order No. 5/24 dated 17th January 1924.

1—3—1924.

M. R. Ry. B. V. Vaideeswara Ayyar Range Officer on special duty is granted privilege leave from 8th February 1924 to 22nd February 1924 both days inclusive.

4—3—1924.

Mr. E. W. Fernandez, Ranger V Grade is granted extension of leave on average pay for 3 months and 6 days on medical certificate from 30th January 1924; in continuation of the leave granted to him. This cancels posting him to special duty in Nellore District.

7—3—1924.

M. R. Ry. C. Balayya Naidu, Ranger V Grade is granted extension of leave by 9 days from 12th March 1924, in continuation of the leave granted to him in this office Service Order No. 63/1923 dated 12th September 1923, prepratory to retirement.

8—3—1924.

M. R. Ry. T. N. Seshagiri Rao, Ranger I Grade, Sathiavedu Range is granted leave on average pay for 4 months from date of relief by M. R. Ry. B. Chenchu Ram Naidu, Ranger IV grade on return from leave in the 1st week of April 1924

11—3—1924.

M. R. Ry. T. Subroilu Naidu, Ranger I grade is granted leave on average pay for 4 months from date of relief by M. R. Ry. G. Devanayakam Naidu who is due back from leave on 25th April 1924.

13—3—1924

M. R. Ry. T. M. Doraiswami Pillai Ranger V grade is granted leave on average pay for 4 months from date of relief by Mr. E. W. Fernandez, who is due back from leave about 12th May 1924.

27—3—1924.

M. R. Ry. C. N. Narasimachari ex-ranger VI grade, Nellore District is reinstated with effect from the date of his joining duty and is posted to Chittoor District.

3—4—1924.

M. R. Ry. S. Vasudeva Reddiar Ranger I grade Sreeharikota Range is granted leave on average pay for one month and 5 days from date of relief by Supernumerary Ranger M. R. Ry. P. K. Kuttappan Pillai, now on special duty in South Cuddapah District.

4—4—1924.

1. Mr. MacBride, Ranger IV Grade Chingleput Range is granted leave on average pay for 4 months from date of relief.
2. M. R. Ry. N. Swaminatha Ayyar, Ranger I grade, Sreeperumbudur Range, will be in additional charge of Chingleput Range *vice* No. 1 on leave.

16—4—1924.

M. R. Ry. T. N. Seshagiri Rao, Ranger I grade on relief from Sathiavedu Range is posted to Chingleput Range of the same District This cancels the posting of M. R. Ry. N. Swaminatha Ayyar of Sreeperumbudur Range to additional charge of Chingleput Range.

The leave on average pay for 4 months granted to Ranger Seshagiri Rao in this office S. O. No. 24 of 24 dated 8th March 1924 is cancelled.

25—4—1924.

M. R. Ry. T. Subroil Nayudu Ranger I Grade in charge of Vempalle Range West Cuddapah District is reduced to the IV Grade of Rangers, his name being placed last on the list in that grade.

3—5—1924.

M. R. Ry. T. N. Seshagiri Rao, Ranger I grade is granted privilege leave on average pay from 5-4-1924 to 17-4-1924 both days inclusive.

9—5—1924.

M. R. Ry. K. R. Krishna Ayyar, Ranger III grade Udayagiri Range is granted leave on average pay for 6 weeks from date of relief by M. R. Ry. A. Siddhan Pillai who is due back from leave on 18—5—1924.

12—5—1924.

M. R. Ry. S. Chidambara Ayyar, Ranger V Grade on return from leave granted to him in this office Service Order No. 18/24 dated 29th February 1924 is posted to special duty in South Cuddapah District for conducting thinning operations of Red Sanders coppice shoots.

23—5—1924.

M. R. Ry. S. Chidambara Ayyar Ranger V grade is granted extension of leave on medical certificate for 3 months consisting of leave on average pay for 2 months and 24 days and half average pay for the rest of the period from 16-5-1924 in continuation of the leave granted to him in this office Service Orders Nos. 5/24 dated 17-1-1924 and 18/24 dated 29-2-1924.

This office Service Order No. 37/24 dated 12-5-1924, posting him to special duty for conducting thinning operations of Red

Sanders Coppice-shoots in South Cuddapah District is held in abeyance.

Fourth Circle.

27—2—1924.

M. R. Ry. K. P. Chathu Nayar, Ranger V grade, West Vellore Division is granted extension of leave on average salary for 2 months in continuation of leave for 1 month on average salary granted to him.

6—3—1924.

In cancellation of paragraph 2 of this Office Service Order No. 1 of 1924, dated 2nd January 1924;

1. M. R. Ry. K. R. Subramaniam, Ranger VII grade, now in charge of Kallakurichi Range, is posted to the charge of Tiruppatur Range, West Vellore Division, on relief by Ranger S. G. Venkataramanan.
2. M. R. Ry. L. R. Narayana Ayyar, Ranger II grade sub-protem will be in charge of Tiruppattur Range in addition to his own until he is relieved by No. 1.

10—3—1924.

1. M. R. Ry. P. Sithapathi Ayyar, Ranger V grade, Chitteri, is transferred to West Vellore Division to take charge of Tirupatur range Vice M. R. Ry. K. P. Chathu Nayar, Ranger on leave.
2. M. R. Ry. S. Ramanujam Sesha, Ranger VI grade, Harur, to hold charge in addition of Chitteri Range.
3. This supersedes Service Order No. 16 of 1924, dated 6-3-1924 posting Ranger K. R. Subramaniam to Tirupatur Range and Service Order No. 1924, dated 2-1-1924 posting him to Shevaroys west.

20—3—1924.

M. R. Ry. T. V. Govinda Rao, Ranger V grade, in charge of Namakkal Range, South Salem Division, is granted leave on average salary for 3 months from date of relief.

22—3—1924.

1. M. R. Ry. K. P. Krishna Ayyar, Range officer, I grade, in charge of the Shevaroys West Range, Central Salem Division, is granted combined leave on medical certificate for 6 months, i. e., privilege leave for 10 days and furlough on average salary for the remaining period from date of relief.

2. M. R. Ry. M. Muthuswami Ayyar, Range officer, II grade, is, on return from leave and on production of medical certificate of fitness to return to duty, posted to the Shevaroys West Range. *vice* No. 1.

23—3—1924.

1. M. R. Ry. S. Doraiswami Ayyar, Ranger IV grade, Cingee range, is granted leave on average pay for 15 days with effect from date of relief.
2. M. R. Ry. M. R. Doraiswamy Ayyar, Ranger V grade, Tiruvannamalai Range, will be in additional charge of Gingee range.

24—3—1924.

1. M. R. Ry. R. Manikkam Pillai, Ranger Officer, Dharmapuri Range, is granted leave on average pay for one month from 23-4-1924 with permission to prefix the ensuing Easter holidays.
2. M. R. Ry. S. Nageswara Ayyar, Supernumerary Ranger on Spike duty is appointed to hold charge of Dharmapuri range vice No. 1.

25—3—1924.

Ranger K. R. Subramaniam, VII grade, in charge of Kallakurichi Range, East Salem District, on relief by Ranger S. G. Venkataramanan, is posted to East Salem District, for special duty for the formation of Class II Panchayats in the Kallakurichi Range.

17—4—1924.

1. Ranger K. P. Chathu Nayar, V grade, on return from leave on 29-4-1924, is posted to the charge of Atur Range, East Salem Division.
2. Ranger Syed Munavar Sahib, VI grade, now in charge of Atur Range, East Salem Division, on relief by No. 1, is posted to the charge of Chitteri range, East Salem Division taking over from Ranger S. Ramanujam Sesha at Harur.

29—4 —1924.

M. R. Ry. K. P. Chathu Nayar, Ranger V grade, West Vellore Division, is granted further extension of privilege leave for 15 days in continuation of the leave granted in this Office Service Order No. 14 of 1924, dated 27-2-1924.

30—4—1924.

M. R. Ry. V. D. Ramalingam Pillai, Ranger VI, South Salem Division, is granted further extension of leave on half average pay for 2 months in continuation of the leave granted to him in this Office Service Order No. 8 of 1924, dated 29-1-1924.

30—4—1924.

M. R. Ry. M. S. Krishnasami Ayyar, Supernumerary Ranger oh special duty is granted leave on average pay for one month witn permission to prefix the Easter holidays.

17—5—1924.

M. R. Ry. M. S. Krishnasami Ayyar, Range officer on special duty, is granted an extension of leave on average salary for three weeks in continuation of the leave already granted to him.

19—5—1924.

M. R. Ry. V. Narayanaswami Ayyar, Ranger V grade, shevaroys East Range, Central Salem Division, is granted leave on average pay for 2 months from date of relief.

2. M. R. Ry. R. Manikkam Pillai Ranger III grade, is, on return from leave on 23-5-1924, is posted to the charge of Shevaroys East Range, *vice* No. 1.

3. M. R. Ry. S. Nageswara Ayyar, Supernumerary Ranger will continue to be in charge of Dharmapuri Range until relieved by Ranger M. R. Ry. V. D. Ramalingam Pillai.

4. M. R. Ry. V. D. Ramalingam Pillai Ranger VI grade, is, on expiry of the leave and on production of a medical certificate of fitness to return to duty on 21-6-1924, posted to the charge of Dharmapuri Range, North Salem Division. This Office Service Order No. 94 of 1923, dated 9-11-1923 posting him to South Salem Division is cancelled.

26—5—1924.

1. M. R. Ry. M. Muthuswami Ayyar, Ranger II grade, (Central Salem Division), will be reduced to III grade for 1 year from 1-6-1924 and his restoration will depend on his good work during that year,

2. M. R. Ry. V. D. Ramalingam Pillai, Ranger VI grade, South Salem Division, is reduced to VII grade with effect from 1-6-1924.

* * * *

Fifth Circle.

10—2—1924.

M. R. Ry. S. M. Krishnaswamy Aiyar, Ranger IV, Tinnevelly, is granted leave on average pay for 2 months and 3 days and on half average pay for 13 days on medical certificate from 14-12-1923.

15—2—1924.

M. R. Ry. K. Rengasayi Naidu, Ranger III grade of Madura District, is transferred to South Coimbatore district. He should report himself to the District Forest Officer, South Coimbatore.

M. R. Ry. M. Gulab Singh is granted an extension of leave on medical certificate on half average pay for 3 months in continuation of the leave granted to him.

18—2—1924.

Ranger Sankunni Menon is transferred from the Development work in Tinnevelly from 2nd March to work under the Logging Engineer Chenath Nair. He will be relieved on the 2nd March and after taking joining time due to him should report himself to the Logging Engineer at Chenath Nair.

20—2—1924.

Ranger A. Culas is posted to charge of Srivilliputtur Range Tinnevelly District.

25—2—1924.

The Leave on average pay for 6 months and 24 days granted to M. R. Ry. K. Rangasayi Naidu, Ranger III grade, Madura, in this office S. O. No's. 69 and 80 of 1923 is extended by leave on medical certificate on average pay for 1 month and 6 days and on half average pay for 24 days.

26—2—1924.

The leave for 2 months and 18 days granted in this Office S. O. No 104 of 23, dated 24-12-1923 to Ranger P. Ramaswamy Iyer is extended by leave on average salary for 3 weeks from 6th February 1924 on medical certificate.

2—3—1924.

M. R. Ry. A. K. Anantharama Iyer Ranger VII grade working under the E. A. C. at Ambasamudram is transferred to VI Circle to work under the exploitation Officer at Chenat Nayar near Olavakode.

8—3—1924.

The leave on average pay on Medical Certificate for 2 months granted to M. R. Ry. M. Sankaran Nayar Ranger VI grade from 15th December 1923 is extended up to 30th June 1924 on medical certificate.

12—3—1924.

M. R. Ry. T. V. Thayuman Mudaliar Ranger VII grade working under the E. A. C. Tinnevelly Development work is transferred to VI Circle to work under the Exploitation officer at Chenat Nayar near Olavakode.

This cancels the transfer of M. R. Ry. A. K. Anantharamier Ranger VII grade, ordered in this office .S. O. 321 2-3-1924.

12—3—1924.

M. R. Ry. P. Ramaswamy Aiyar, Ranger VI grade Tinnevelly is granted leave on average salary on medical certificate for one month from 27th February 1924 in continuation of the leave granted in this office No. 31 of 1924.

Md. Gulab Singh, Ranger, VI grade is reduced to the bottom of the VII grade for six months from the 18th February 1924.

28—3—1924.

M. R. Ry. S. Shanmughakumaran Pillai Ranger II, Madura Dt. is granted leave from 11th February 1924 to 15th September 1924 (privilege leave for one month and 6 days and commuted furlough on medical certificate for the remaining period) under simplified leave rules of 1920.

9—4—1924.

The leave granted to M. R. Ry. K. Rangasayi Nayudu, Ranger III for 8 months and 24 days (8 months on average pay and 24 days on half average pay) in this office S. O. No. 29/24 is extended by leave on medical certificate on half average pay for 1 month.

10—4—1924.

The leave on average pay on medical certificate granted to M. R. Ry. P. Ramaswamy Ayyar, Ranger VI, in this office S. O. No. 31/24, dated 29th February 1924 is extended by one month and one day.

In modification of this office S. O. No. 19/24, dated 10th February 1924, M. R. Ry. S. M. Krishnaswamy Ayyar Ranger IV is granted leave on average pay from 14th December 1923 to 28th February 1924 inclusive. The leave from 30-12-1923 to 28-2-1924 is on medical certificate.

17—4—1924.

In supercession of this office S. O. No. 38/24, dated 28th March 1924, M. R. Ry. S. Shunmugha Kumaran Pillai, Ranger II, Madura District is granted leave from 11th February 1924 to 15th August 1924 (Privilege leave for 6 days and commuted furlough on medical certificate for the rest of the period) under the simplified rules.

23—4—1924.

M. R. Ry. A. R. Kunhuni Nayar Ranger V grade is granted two months leave on average pay (Rs. 125) from 12th April 1924.

25—4—1924.

M. R. Ry. S. Venkataswamy Naidu, Ranger V grade, Tinnevelly is granted leave on average pay on medical certificate for 3 months from 1-5-1924 in continuation of the 4 months leave from 1-1-1924.

7—5—1924.

The leave on average pay on medical certificate granted to M. R. Ry. P. Ramaswamy Ayyar Ranger VI grade in this office S. O. No. 45/24, dated 9th April 1924 is further extended by 2 months.

24—5—1924.

The leave granted to M. R. Ry. M. Gulab Singh, Ranger, South Coimbatore, in this office S. O. No. 23/24, dated 15th February 1924 is extended by 3 months (2 months and 2 days on half average salary and the rest without pay).

Sixth Circle.

26—2—1924.

Mr. A. Nicholas, Ranger III grade, North Mangalore Division, is granted leave on average pay on medical certificate for 1 month and 8 days from 1st February 1924

18—3—1924.

The leave on average pay on medical certificate for 1 month 8 days from 1st February 1924 granted to Mr. A. Nicholas, Ranger III grade in S. O. No. 15/24 dated 26th February 1924 is extended by 2 months.

1—4—1924.

M. M. Mandanna, Supernumerary Ranger, Wynaad Division, is granted leave on average pay on medical certificate for three months and three days from 28th January 1924 to 30th April 1924 both days inclusive.

4—4—1924.

M. P. Subbayya, Ranger on special duty, Nilambur, is granted leave on average pay for two months from 8th April 1924.

M. R. Ry. K. R. Krishnan Nair, Ranger III grade, Palghat is appointed as Intsructor, Vernacular Training School to be held in the Nilambur Division.

M. R Ry. K. Raghavan, Supernumerary Ranger, Nilambur, is appointed as Assistant Instructor.

22 4—1924.

1. P. Sankunni Nayar, Supernumerary Ranger in charge of the Shankeranarains Range is granted leave on average pay for one month from the date of relief.

2. Forester C. D. Silva to be in charge of the Shankeranaraina Range vice No. 1.

2—5—1924.

Mr. H. Myers, Ranger V grade, from Palghat to the Forest Research Division for work at Dhoni *vice* Ranger K. Appiah, who is to report for duty to the Logging Engineer, directly on relief.

4—5—1924.

M. R. Ry. A. Rama Hebbar, Ranger III grade, transferred to this circle in Chief Conservator's Reference No. 190/B-4. 23-3 dated 24th April 1924, who is due back from leave on 6th May 1924, is granted an extension of leave on average pay for 1 month.

21—5—1924.

The leave on average pay on medical certificate for 3 months and 3 days from 28th January 1924 granted to M. M. Mandanna, Supenumerary Ranger, Wynaad Division in S. O. No. 25 dated 1—1—1924 is extended by one month.

22—5—1924.

M. R. Ry. A. Rama Hebber, Ranger III grade, who is due back from leave on 7th June 1924 is posted to the charge of the Mudumalai Range, the Nilgiris Division.

This office S. O. No. 8 of 1924 dated 22-1.1924 posting Ranger A. Nicholas to the charge of the Mudumalai Range is cancelled.

GUNS, REVOLVERS,
AND
AUTOMATIC PISTOLS.

For best value in,

Hammer and Hammerless
12 Bore Sporting Guns,
Hammerless Ejector Guns,
Browning Automatic Pistols,
— Revolvers —
of a thoroughly reliable quality.

Send for Price List:—

BARTON Son & Co.,
(LIMITED.)
BANGALORE & OOTACAMUND.

FLORISTS and FRUITISTS.

GENUINE SEEDS!!! — SHOW GARDEN!!! — RELIABLE PLANTS!!!

Salem Mango Grafted Plants three years old As. 8 to Re. 1. Wholesale rates all sorts Rs. 50 per 100. Fruit Grafts Guava, Pomegranates different sorts coloured Crotons and Roses Rs. 6 per dozen each. Orange Grafts, Lime Grafts, &c., Rs. 9 per dozen. Fruit Tree Seeds all Varieties.. English Vegetable and Flower Seeds 20 sample packets Rs. 2 each. English Vegetable and Flower seeds per 10 sample packets Rs. 1 4 0 each.

Indian Vegetable Seeds all Varieties supplied at Cheap Rates.
1924 Catalogue with Calendar supplied free on application.

Salem Mango Fruits Supplied from April to June.

S. K. I. ABDUL RAHIMAN SAHIB, Proprietor,

Tel. Address: "**Nursery Salem.**" "Salem Nursery Gardens," **SALEM.**

WANTED.

Ranger, Pay Rs. 100/-. Coimbatore man, or, Similar qualifications. Must know Hindi. Apply to:

Superintendent,
Jashpur State, Jashpurnagar, C.P.
Via RANCHI.

Advertisement Rates.

The Magazine is expected to have a wide circulation among Forest Officers in the Madras Presidency. Such articles as are useful to them as camp equipments, books, mechanical appliances, transporting gear etc., etc., can be advertised with advantage through this medium.

The following is the Schedule of rates.

		Single Insertion	Per annum.
For full page	...	Rs. 6.	Rs. 12.
Half page	...	„ 4.	„ 8.
Quarter page	...	„ 2 as. 8.	„ 5.

Preparation of blocks unless supplied by the advertiser charged extra.

Charges are payable in advance; the advertisements are subject to the approval of the working committee before insertion.

All business communications should be addressed to:

THE BUSINESS SUPERINTENDENT M. F. C. MAGAZINE
Madras Forest College, Lawley Road, P. O.,
Coimbatore.

Literary communications should be addressed to:
THE EDITOR, M. F. C. MAGAZINE,
Madras Forest College, Lawley Road, P. O.,
Coimbatore.

All remittances may be made to:
THE TREASURER, M. F. C. MAGAZINE,
Madras Forest College, Lawley Road. P. O.
Coimbatore.

The Madras Forest College Magazine.

Published Quarterly.

Subscriptions.

Subscription per annum Rs. 2/-and an entrance donation of Rs. 2/-for students of the College.

Rangers, Foresters etc., same terms as students. Assistant and Extra Assistant Conservators—Entrance donation of Rs. 5/-and an annual subscription of Rs. 2/-

Other Officers—Entrance donation of Rs 10/-and an annual subscription of Rs. 2/-

The *September* Number being the *first* issue of every volume, or year, of the Magazine, will be sent by V. P. P. for Rs. 2—2—0, the payment covering all four issues of the year and the Registration fee for the V. P. P.

It is not intended that the Magazine should be run at a profit so that as our subscribers increase the magazine will be issued in a more attractive form.

It is the aim of the Management to run the Magazine for the Ranger-class (including Foresters) and mainly by their contributions Correspondents are needed to supply suitable matter to maintain the magazine on these lines. We feel confident that this appeal will not go in vain. There must be a number of our readers who have something of interest to write on.

Subscribers are requested to inform the editor of all changes of address.

Obtainable from the Business Superintendent,
Madras Forest College Magazine,
Lawley Road, P. O., Coimbatore.
SOUTH INDIA.